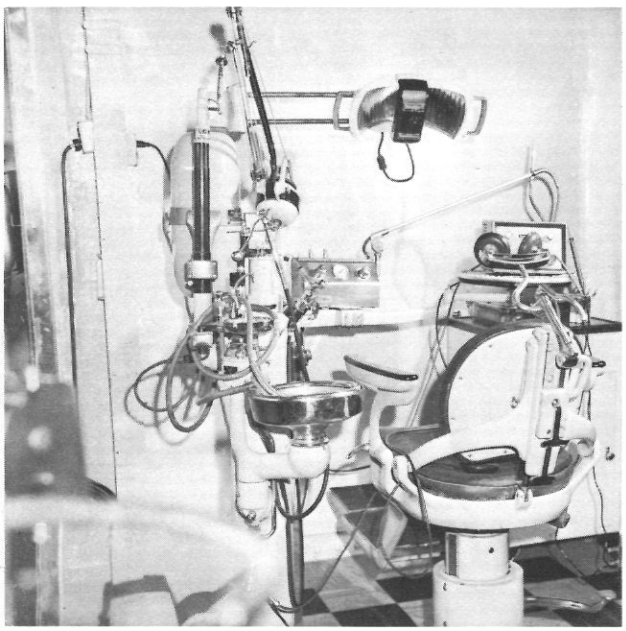
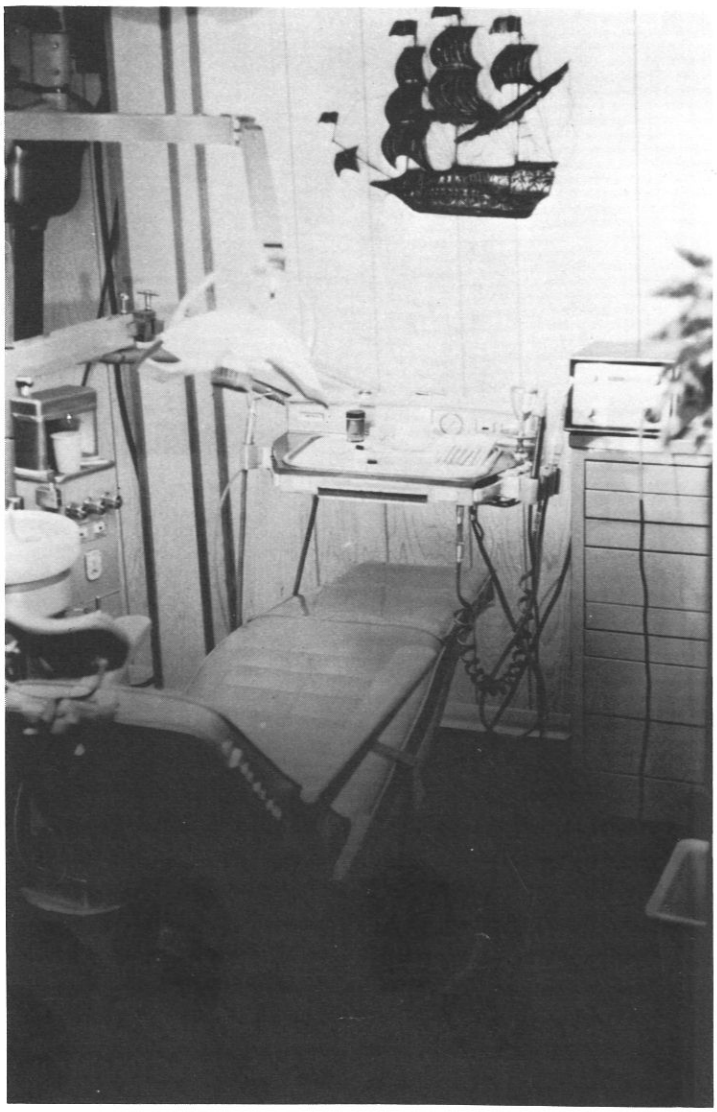
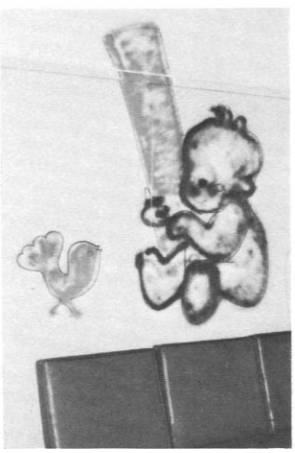
U. S. NAVY Medicine







April 1972

United States Navy Medicine

Vol. 59 April 1972 No. 4

POLICY

U.S. Navy Medicine is basically an official Medical Department publication inviting the attention of officers of the Medical Department of the Regular Navy and Naval Reserve to timely up-to-date items of official and professional interest relative to medicine, dentistry and allied sciences. The items used are neither intended to be, nor are they, susceptible to use by any officer as a substitute for any item or article, in its original form. The opinions and conclusions expressed in the articles or items included herein are those of the respective authors and do not necessarily represent the views of the Department of the Navy, the Bureau of Medicine and Surgery or any other governmental department or agency thereof.

DISTRIBUTION

U.S. Navy Medicine is distributed to active duty Medical Department officers via the Standard Navy Distribution List (SNDL) vice personal addresses. Any increase or decrease in the number of allotted copies should be requested via the local Commanding Officer through U.S. Naval Publications and Forms Center, Code 306, 5801 Tabor Avenue, Philadelphia, Pa. 19120. Other addressees may forward changes of address in the same manner, giving full name, rank, corps, old and new address, and zip code. The mailing label taken from the most recent issue should be forwarded if possible. See inside back cover for CORRESPONDENCE AND CONTRIBUTIONS.

The issuance of this publication approved in accordance with NAVEXOS P-35.

NAVMED P-5088

CONTENTS

Credits: All pictures are Official U.S. Navy Photographs unless otherwise indicated.

Our cover displays *before and after* views of a dental operatory in USS JASON (AR-8), and fanciful mural scenes adorning the bulkheads in the dependent's clinic at NAS Barbers Point. To determine what these items have in common, readers are directed to the feature article "Self-Help," which begins on page 3.

Page 2 photograph reveals VADM George M. Davis, MC, USN, Surgeon General (right) being welcomed by CAPT Charles E. Kee, MC, USN, CO Nav Hosp Long Beach, Calif., and CAPT Mildred Henry, NC, USNR, Chief of Nurses at Nav Hosp Long Beach. CAPT W.H. Jones, MSC, USN, AO, Nav Hosp Long Beach, with outstretched arms, gestures an intent to rescue CAPT Alene B. Duerk, NC, USN, Director, Nursing Division, BUMED, who is smartly disembarking from the aircraft. ADM Davis visited the Naval Hospital at Long Beach with members of his staff in the fall of 1971.

Continued support of Mrs. S.B. Hannan, BUMED Code 4542, and the Illustration and Exhibits and Photography Divisions of the Medical Graphic Arts Dept., Naval Medical School, NNMC, Bethesda, Md., is gratefully acknowledged.

from the Chief

During the past two years a vigorous effort to improve personal services provided in Navy facilities has been directed by the Chief of Naval Operations. Overall objectives are to reduce the time required to obtain service and improve the availability and quality of service. In conjunction with the CNO's program, standards of health care services have been established for our 38 naval hospitals and 194 dispensaries. The standards which serve as goals for each treatment facility include the following: routine appointment availability within ten days of request, minimum waiting time after arrival, adequate time spent with patient for quality care, centralized outpatient care and services, centralized appointment system, after hours Walk-In Clinic and evening clinics, adequate receptionists to furnish assistance to patients and staff, preventive health programs, improved administrative and clerical support to free physicians and dentists for professional care, and improved appearance and adequacy of clinics and waiting rooms.

Some of the standards were already being met by many medical activities. Many more of these goals have been achieved by adopting more responsive approaches to health care delivery, rearranging spaces, adjusting work hours, improving communication between medical staff and patients, and by enhanced utilization of paramedical personnel. Self-help programs are becoming numerous, and deserve particular mention for the enthusiasm thereby generated among patients and staff.

I hope you will continue to keep me advised of these developments which can often be profitably shared with others, and implemented elsewhere.

☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆

SELF-HELP

The Navy can be justly proud of its men who have earned a reputation for a long-sustained "Can Do" attitude. The fraternal spirit is closely associated with a healthy, dynamic vigor that pervades commands and activities which fulfill their respective missions with determination, imagination and enthusiasm. An organization is destined to prosper when its members are personally committed to build and to serve. It is tempting, perhaps, to complain that one's professional objectives are thwarted and precluded by a lack of support. Yet resources eventually accrue for the men with sufficient vision to demonstrate the need for, or value of, their efforts. One of the exciting challenges provided by today's world is the fact that a man who sincerely strives and labors for a significant cause cannot be long ignored. There is a growing perception that the obstructionist, those who "play it safe" and are dedicated to inactivity, are the real enemy.

Examples of splendid accomplishment and leadership are numerous, yet we infrequently direct public attention to them. Satisfaction may be its own reward, but there is a lesson to be learned from a consideration of the vast improvements resulting from personal effort. Self-help programs fall into this category and the following excerpts are offered in evidence.

Toys For Pediatric Clinic

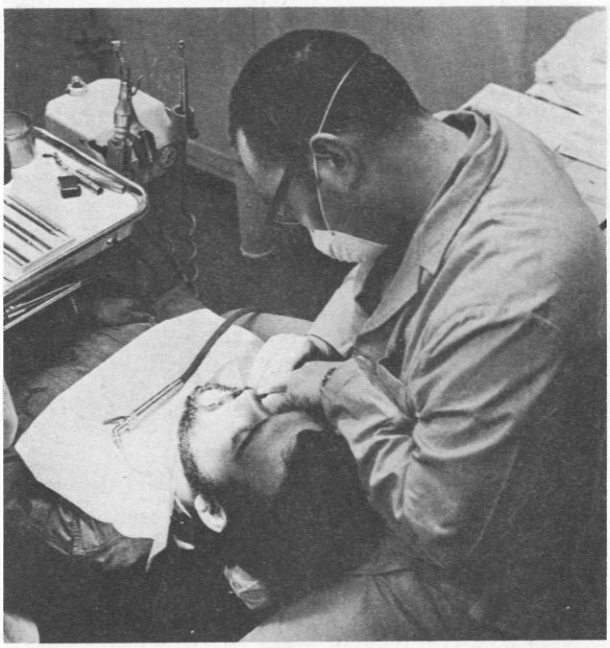
The Pediatric Service of the Naval Hospital, NNMC, Bethesda, Md., boasts a generous set of handcrafted miniature furniture. LT Albert Schuster, MSC, USN (Ret.) spends most of his time creating the furniture in the basement of his home in College Park, Md. Each year around Christmas time, LT and Mrs. Schuster visit the naval hospital to present lovely new pieces of the miniature furniture (via the Navy Medical Service Corps Officers' Wives Club). LT Schuster purchases all the required materials with his own funds and has already donated a miniature stove, refrigerator, kitchen sink, hutch cabinet, wishing well, baby crib, chest of drawers, rocking horse, rocking octopus, and a dollhouse filled with furniture. Children visiting the Outpatient Pediatric Clinic and the Pediatric Acute Care Clinic at the naval hospital enjoy the toys while awaiting medical treatment, and children on the Pediatric Ward get to play with them while recuperating. It is clear that enthusiasm and dedication did not cease with retirement in 1951 for LT and Mrs. Schuster.

LT and Mrs. Albert Schuster, MSC, USN (Ret.) (left) presented a kitchen sink and hutch cabinet with hand-painted Red Riding Hood dishes to the Pediatric Service at Nav Hosp, NNMC, Bethesda, (via the MSC Officers' Wives Club) in Dec. 1971. The handcrafted miniature furniture was received for the hospital by CDR David W. Bailey, MC, USN (right), Chief of the Pediatric Service. Mrs. John Turner, President of the MSC Officers' Wives Club is standing behind the Schusters.—PAO, NNMC, Bethesda, Md.

Dental Clinic In MIDWAY

Two years ago CDR Richard D. Ulrey, DC, USN, Senior Dental Officer in the attack carrier USS MIDWAY, determined to create a more pleasant atmosphere for sailors requiring dental attention both in port and while at sea. Despite the usual lack of money and materials, MIDWAY now boasts a luxurious dental department. Most of the remodeling was accomplished while the ship was undergoing overhaul in San Francisco, but it took considerable naval ingenuity to obtain the necessary materials. Patients can now enjoy wall-to-wall carpeting, acoustic tile overhead, soft music and bulkheads of wood-grain paneling. The Preventive Dentistry Program is managed in a room that accommodates four patients at a time, where a step-by-step method of dental care is presented. Prerecorded instructions and a slideviewer are utilized, and 60 men can be indoctrinated in an afternoon. The program and facilities are said to be unique in the fleet.

Three dental officers, seven dental technicians and one striker assist CDR Ulrey; together, they often treat over 100 patients per day. Appointments are scheduled to suit the individual. During a recent survey of MIDWAY's crew, 2,120 personnel were checked and dentally classified. The results indicated that 1,200 needed no treatment at the time, 829 were in need of some treatment, and 91 required immediate care.

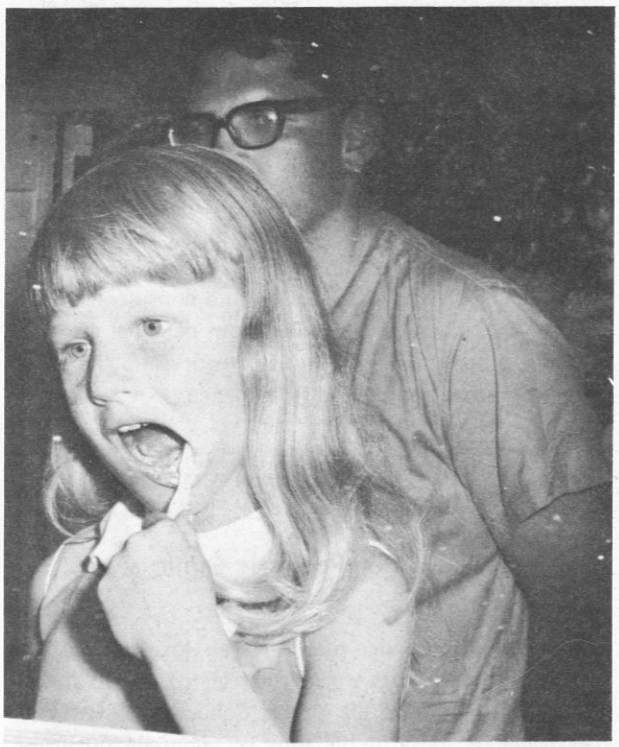


LT RSN Chang fills a cavity for MIDWAY sailor. LT Chang is one of three dental officers assigned to the attack carrier.—PAO, 7th Fleet Det "C." Photo by JOSN Mark Wilson.

The Dental Company And Community Concepts

Suggested by MAJGEN G.C. Axtell, USMC, the community concept is one of personalizing the services rendered to marines. The object is to enable an individual marine to feel that he has his own special medical officer, dentist, and chaplain to whom he can go for consultation, advice and treatment. The 12th Force Dental Company, 2nd Marine Aircraft Wing, USMC Air Station Cherry Point, N.C., has implemented this concept by assigning dental officers to a group or squadron for liaison purposes. Attending his group's conferences and social events, the dental officers acquaint marines with available dental services such as the Preventive Dental Program and the Plaque Control Program. Through informal communication problems are aired, appointment failures for example, and better mutual understanding and cooperation develop between the marine community and the dental department.

Two trailers have been converted to Preventive Dental units. These are taken to the marine work center to provide a taped preventive dentistry lecture and three-stage stannous fluoride preventive therapy. One

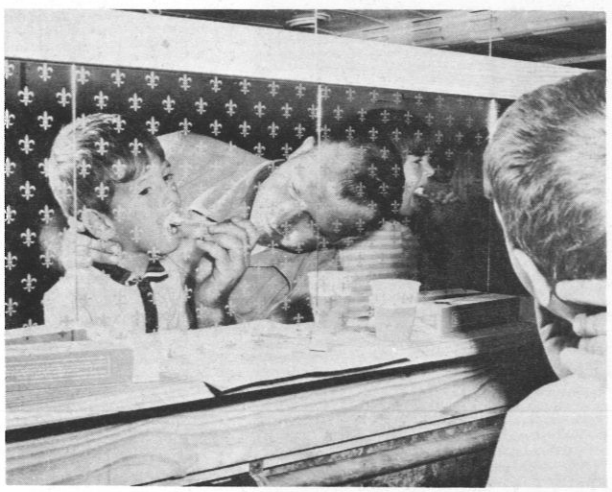


Angela McMullin brushes disclosing solution from her teeth as DT2 Don Price observes her technique in a 12th Dental Co. mobile unit at Cherry Point.

trailer treats approximately 40 men per day — saving an estimated one hour of marine work time per patient, or 100 man work days per month.

Trailers are also deployed to the housing areas for the Dependent Children Preventive Dental Program. Dental wives and dependent residents in the housing areas assist and take an active interest in the program. Tents are set up as required, with two field chairs employed for topical applications. Though the dental work accomplished is serious and professional, the "circus atmosphere" enhances interest and participation in the program by the community.

Instructions on proper brushing, with a dental technician supervising in each of two vans, are featured in the 12th Dental Co. program.



Michael McMullin gets a helping hand from DT1 Jim Player in the 12th Dental Co. program.

New Food-Service System

The Naval Hospital Pensacola, Fla., initiated a new food-service system 20 Jan 1972 in an effort to provide hotter, more palatable meals to patients. The new system was developed by Aladdin Industries and the naval hospital is the first large military hospital to employ it. Insulated plastic trays with disposable plastic inserts have replaced the old trays, plates, bowls,

LT N.R. Petersen, MSC, Chief of Food Services Division at Nav Hosp Pensacola (left) and his assistant HMCS Don H. White (right) check food temperature prior to serving. Food must be adequately hot if the new thermal trays are to maintain food at serving temperature for periods up to two hours.

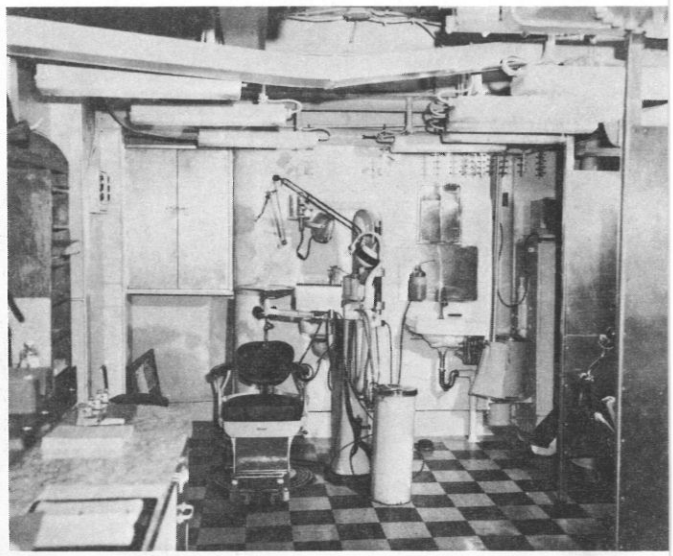
hot pellets and covers. When filled, the trays are stacked one atop another and can be rapidly wheeled on serving carts into the various wards. Insulating quality of the trays enables them to maintain foods at proper serving temperatures for periods up to two hours. The only expenditures involved are for the plastic disposable inserts that actually hold the food. The Navy will not be required to purchase the thermal trays, serving carts or special washing racks for the new system. Only the thermal trays and silverware are washed and reused, thereby eliminating the need for considerable dishwashing. The new system is expected to prove satisfactory and replace the older methods of serving food.

LT Neil R. Petersen, MSC, USN (right) explains the new food-service system to RADM Oscar Gray, Jr., Commanding Officer of the Naval Aerospace Medical Center (2nd from right). Standing from left to right are: CDR William E. Whitlock, MSC, USN, AO Nav Hosp, Pensacola; CDR Jean P. Kirsch, MSC, USN, professional assistant to RADM Gray, and; CAPT Neil V. White, MC, USN, CO Nav Hosp Pensacola.

RADM Oscar Gray, Jr., MC, USN was among the officers who sampled a meal served in the new thermal trays. "Most enjoyable, attractive and appealing," pronounced RADM Gray.—Nav News Bureau, Naval Air Basic Training Command, NAS Pensacola, Fla. Photos by JO3 Watkins.

USS JASON Dental Clinic

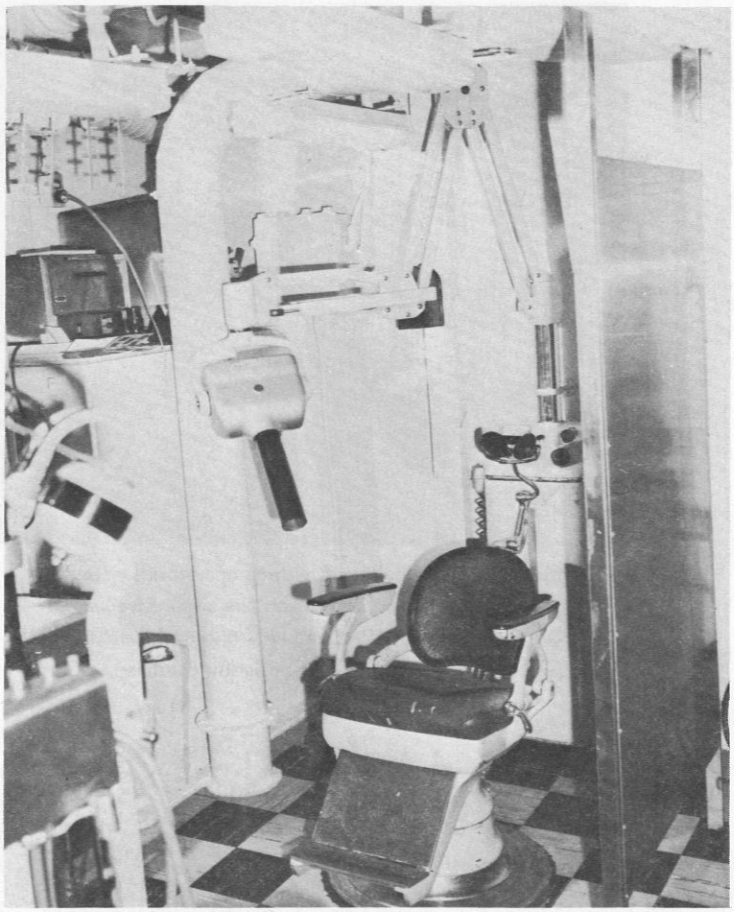
When CDR George A. Short, DC, USN arrived at the Dental Clinic in USS JASON (AR-8) in Sept 1970, he noted that some new Weber units and chairs had been acquired. All of the Dental Department agreed that a major face lifting was required, and all dental personnel willingly pitched in to transform the area, with the blessings of the Commanding Officer and Executive Officer. Approximately $850 was required to purchase wood paneling, overhead and carpeting. On 6 Jan 1971 JASON deployed, and the Dental Department was committed to begin and complete modernization of dental spaces in a period of 19 days, by the time of their arrival in WESPAC. With technical advice solicited from two carpenters, CDR Short and his six dental technicians laid aside pluggers and pullers, wielding hammers and saws by day and by night; one chair was kept operable at all times for emergency use. On 24 Jan 1971 the new dental emporium was unveiled to the delight of the entire ship and satisfaction of the seven dental remodeling experts.



Before remodeling, looking aft, three operatories were positioned with stainless steel partitions. The administrative desk was awkwardly located against the port bulkhead (left foreground). Note standard deck and unsightly overhead.

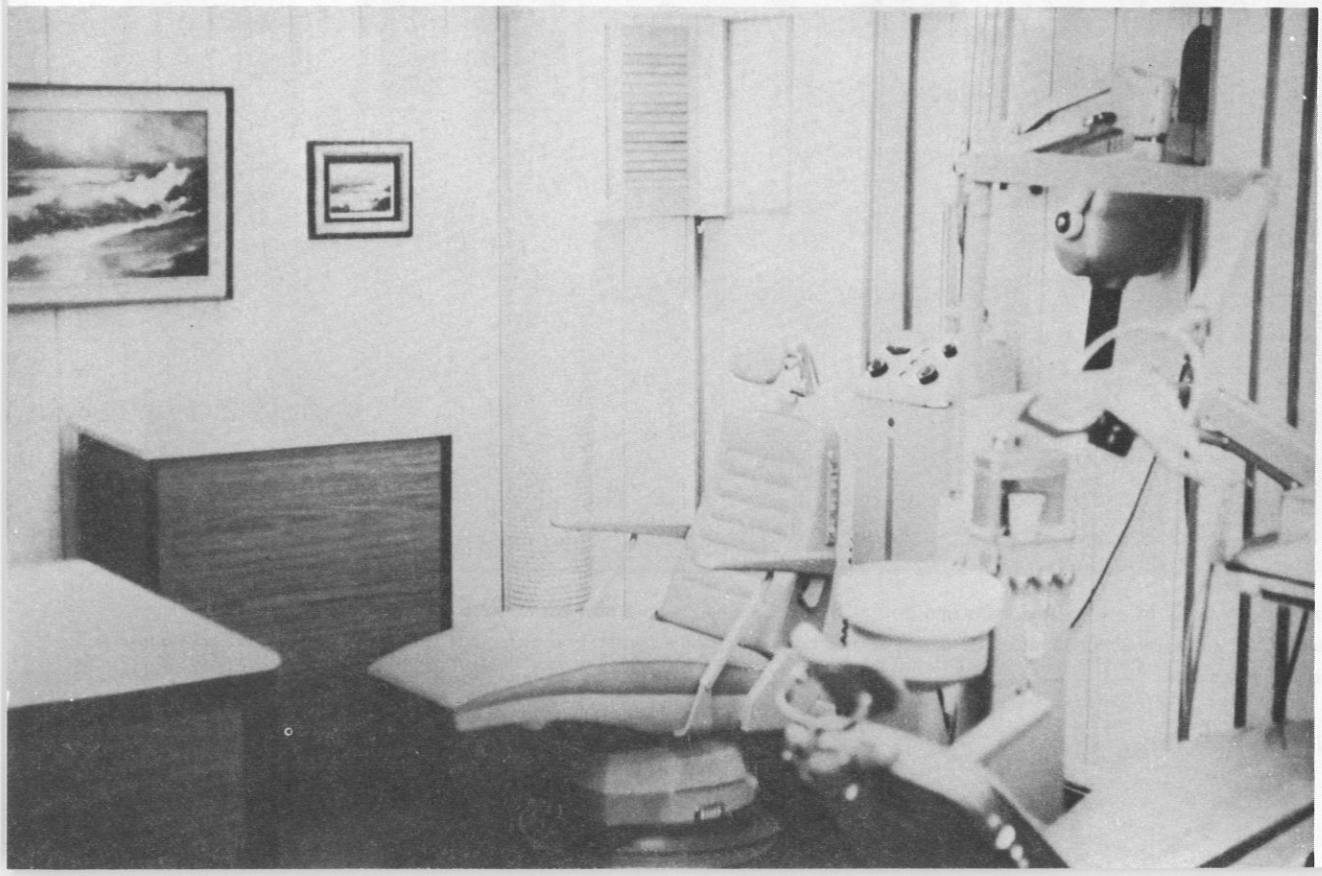
Dental Emporium in USS JASON

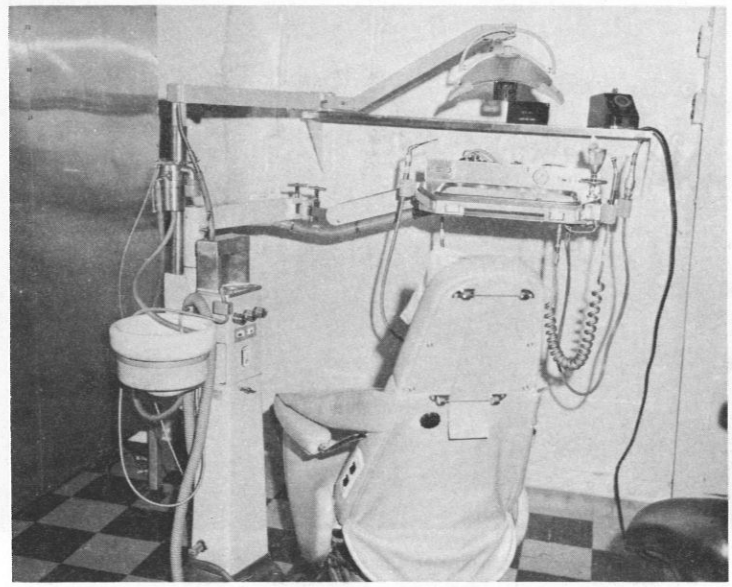
Following removal of one of the chairs and unit at the end of the clinic, a new administrative desk was created and properly located at the entrance to the clinic. The improved overhead, royal blue carpet, and attractive light-wood paneling are best appreciated in color slides.



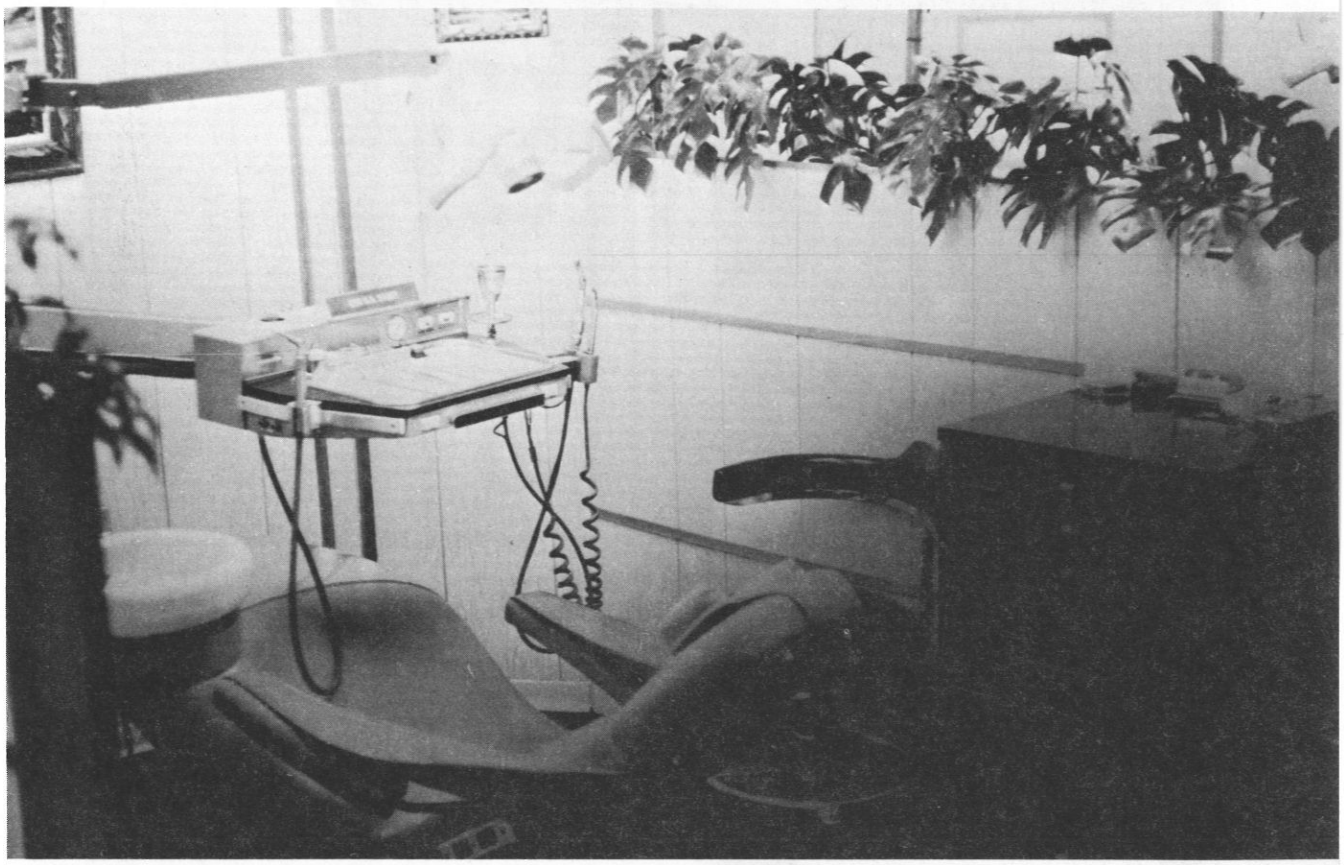
Before remodeling, the forward starboard corner contained the X-ray unit. Note dry-clave and small autoclave in left upper portion of photo.

After remodeling, the forward starboard corner appears less crowded and cluttered. The dry-clave and small autoclave are boxed in a small cabinet area. The stanchion is adorned with rope, and chairs are upholstered in light blue vinyl.



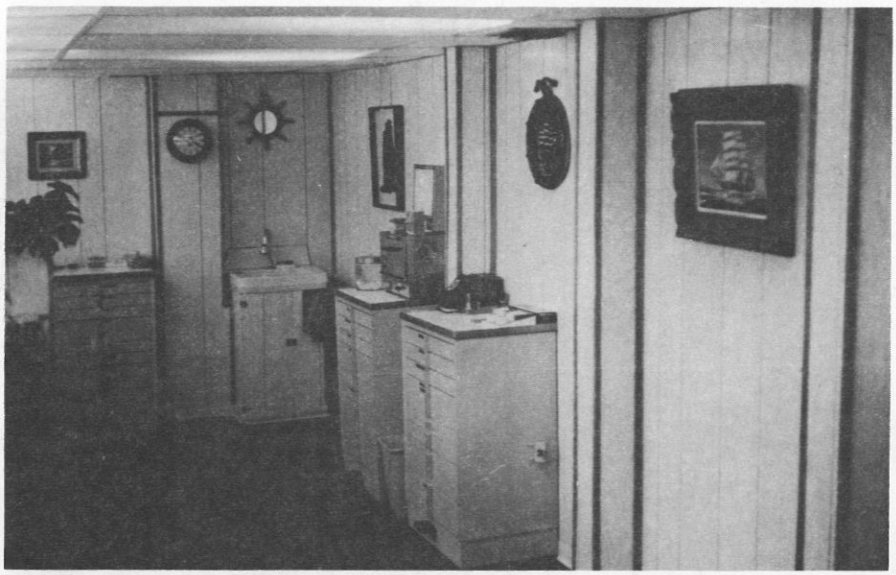


Operatory No. 2, before face lifting.

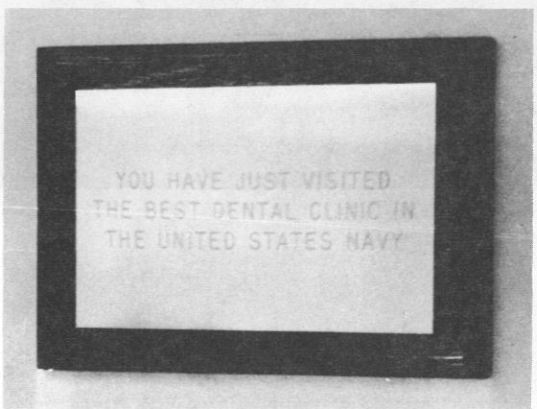


Operatory No. 2 after remodeling.

Three inviting operatories emerge. Stereo equipment includes six speakers mounted in the overhead and each chair is equipped with earphones for enjoyment of patients.



After face lifting, attractive fixtures and oil paintings on the bulkheads replace amalgamators and useless shelves. Unnecessary cabinets were eliminated.



The plaque that appears on the exit door was presented to CDR Short by six exceptional dental technicians. *(We know of seven incredible carpenters and interior decorators, who work fast and hard. And that's not even their prime mission in USS JASON.)*

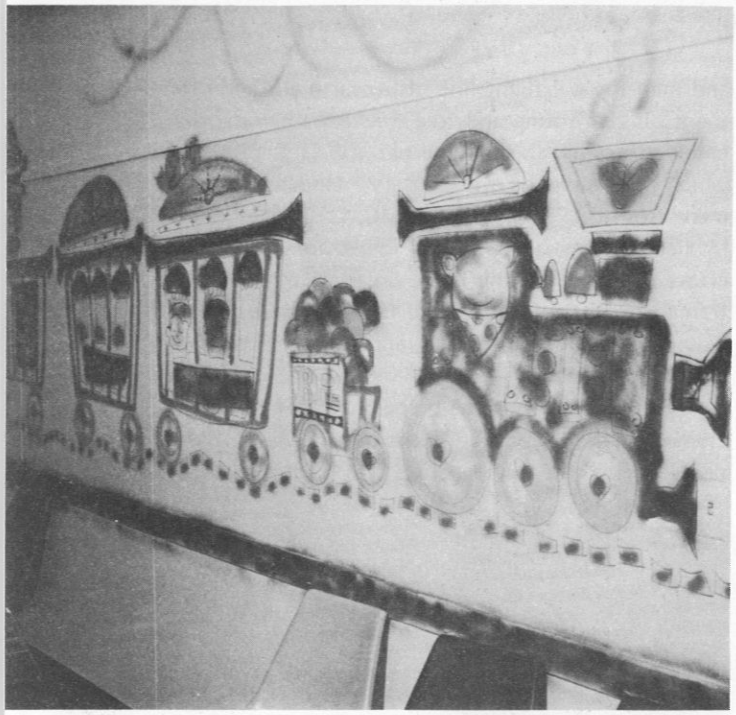
Medihune

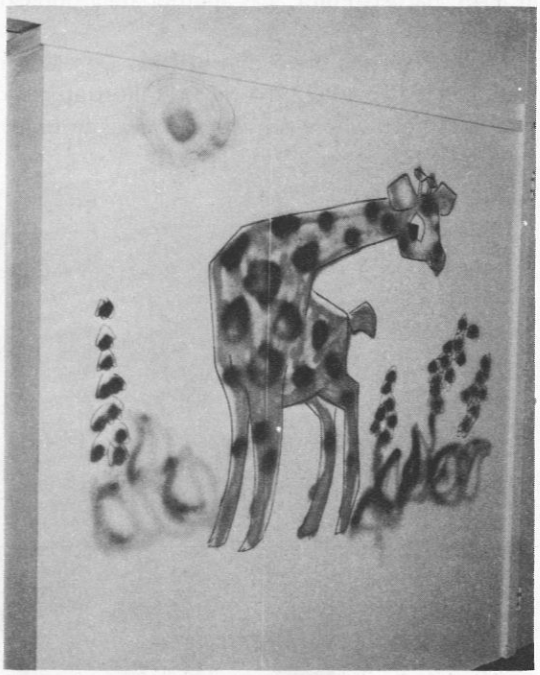
A menehune is the Hawaiian Islands' counterpart of the Irish leprechaun. The menehune delights in helping people. He has been known to prevent rain during the Admiral's Change of Command ceremony, bring up the surf on legal holidays, fill the nets at a hookalau, and provides continual amusement for tourists and other malihines who visit the Hawaiian Islands. The menehune that appeared in the outpatient dispensary at NAS, Barbers Point, was appropriately dubbed "Medihune."

Medihune is the brainchild of HM1 Don Martin who was attached to VP-22. A medical illustrator and hospital corpsman whose primary duty was to organize and man the VP flight line dispensary, HM1 Martin spent his spare time and free weekends helping the all-hands effort to renovate the old WW II station hospital which now serves as a dispensary. Under encouragement from CAPT G.F. Kelly, MC, USN, the Senior Medical Officer, all personnel joined in a maximum effort to transform the large, dreary, dark, antiquated frame building into a medical facility where the staff would be proud to function, and patients would be pleased to visit.

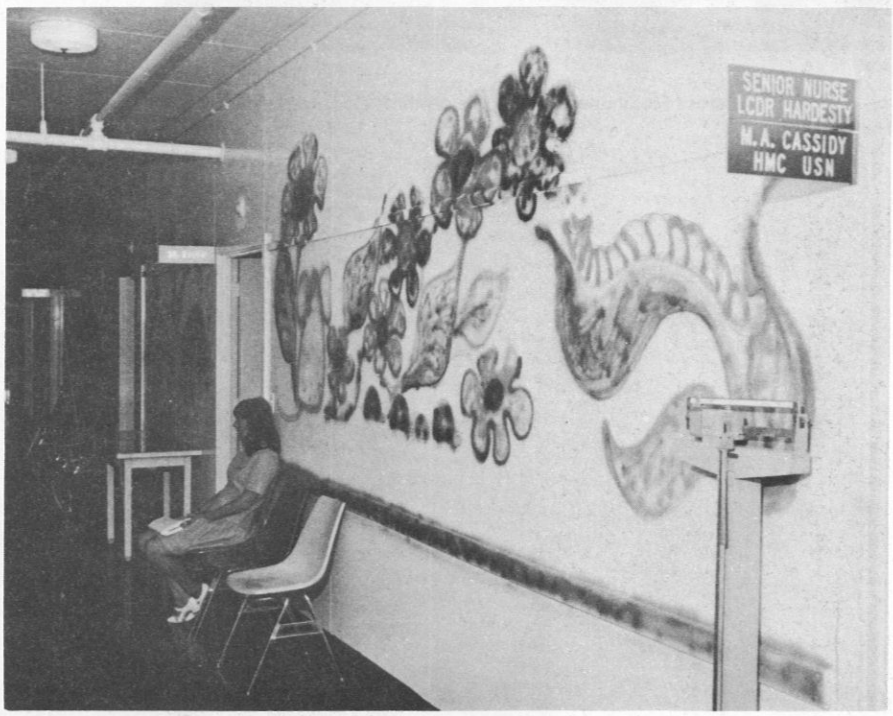
With a critical shortage of personnel and bleak chances of acquiring significant outside help, it was decided that the only recourse was to devote Friday

Before Medihune came to the Medical Dept. at NAS Barbers Point.





Medihune antics (must be seen in color slides to be appreciated).



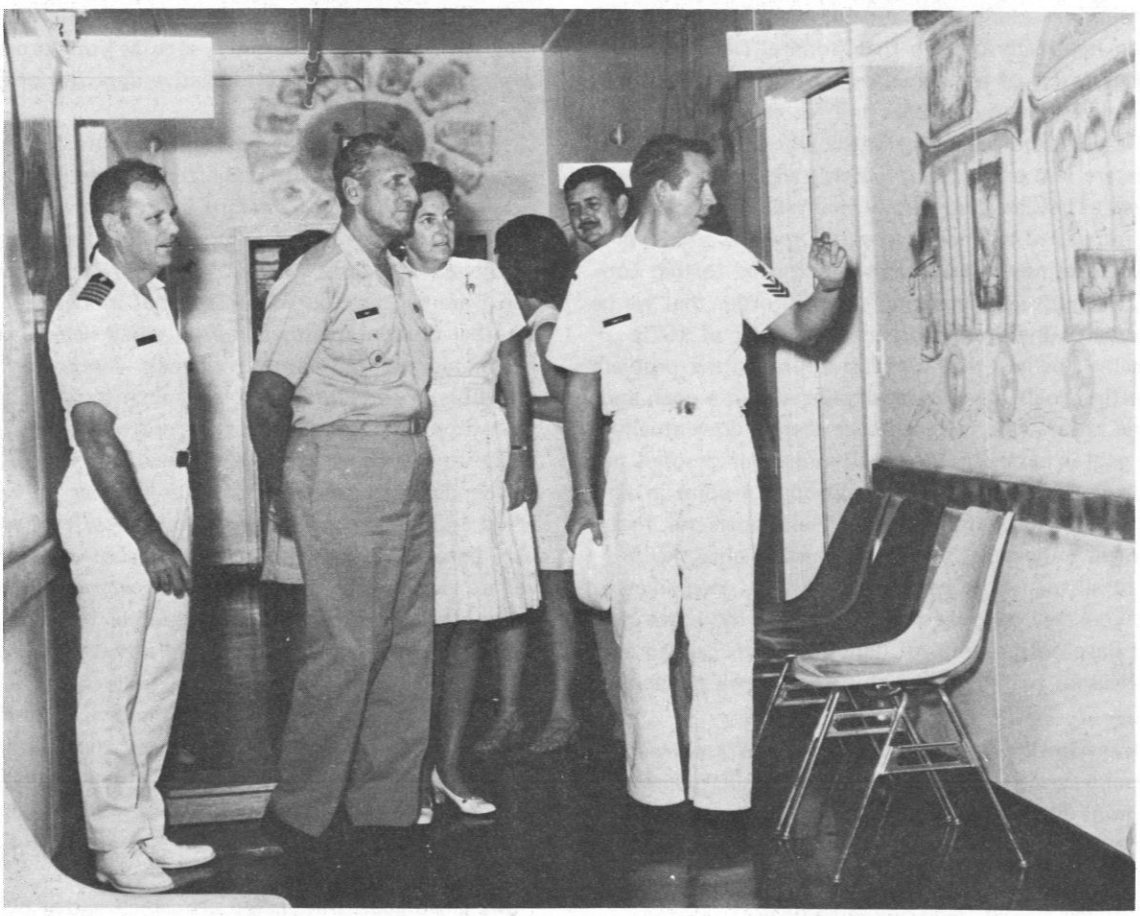
afternoons to the task. Doctors, nurses, corpsmen, Waves, wives and Red Cross volunteers served as painters, carpenters and interior decorators. Even the chiefs were regularly seen up to their elbows in paint buckets. The big push was on!

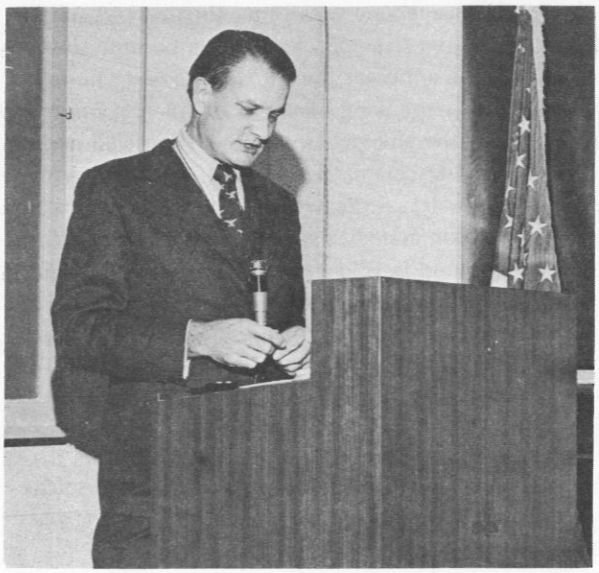
When HM1 Martin first mentioned painting elephants on bulkheads in the dependent's clinic, command reaction was typically Navy. An occasional print of a battleship might be used to brighten stark white passageways—but elephants, never! HM1 Martin insisted, however, gaining support from nurses Stella Hardesty and Linda Stow. The elephants won! Doctors got caught up in the spirit, buying their own rugs and drapes.

Medihune may be seen perched on top of a life-sized pink elephant leading a parade down the main passageway, a Band-Aid placed at a jaunty angle over his forehead. Legend has it that Medihune was once an ordinary menehune who came aboard NAS Barbers Point during the last open house. He became so engrossed in the antics of the Blue Angles that he failed to duck under the wing of a parked A4. So impressed was he with the emergency treatment received at the NAS Medical Department, that he adopted the activity where he remains, dedicated to making patients happy. As HM1 Martin added to the murals, the passageway was transformed in bright fantasy, featuring Medihune and a colorful assortment of friends that represent the entire animal kingdom and every ethnic group known to the islands.

Young patients are particularly fascinated and amused. Waiting areas are notably more quiet. If the atmosphere is bright and appealing, so are the spirits of the medical personnel who brought it about, and the patients who enjoy it.

Artist HM1 Martin (right) is congratulated for a splendid accomplishment by RADM F.B. Voris, MC, USN (now retired) and Mrs. Voris, as CAPT Kelly (left) beams approval.





Dr. Wilbur Addresses

Physician's Aid Screeners

Admiral Davis, Admiral Ballenger, Captain Rupnik, members of the staff and students of the Second Physician's Aid Screener Course, it is indeed a pleasure to be invited to address you today.

I am especially pleased that Admiral Davis suggested I discuss some of my thoughts for improving health care delivery in the Services and for career opportunities for enlisted personnel in the allied health field. These are two areas about which I am vitally concerned. They are also totally interrelated. I would also emphasize that as we progress toward an all volunteer force, and I am deeply committed to that concept, we must get "cracking" now in order that we be ready when the draft ends in the summer of 1973. Basically I believe that we must approach the problem by setting goals, defining each step within a goal, and setting a timetable to reach each step and eventually each goal in order that we may assess our progress and take necessary actions at the appropriate point in time.

I have set three major goals. These goals are, first, and most important, the provision of quality health care to all for whom we are responsible. Regardless of what you may have read or heard from the news media, I have no intention of denying health care to any beneficiaries be they active duty personnel, dependents of active personnel, retired, dependents of retired or dependents of deceased members. Now, how well we are able to provide this quality care is what is important. We have several possible options some of which may be implemented directly, such as your program, while others may require legislative approval prior to implementation.

My second goal is the accomplishment of an all volunteer health force within the time frame set for us by President Nixon and Secretary Laird. This goal is necessary for many reasons other than just the expiration of the current draft law on 1 July 1973. I believe, and I am certain you will agree, that individuals — whether doctors, dentists, nurses, allied health specialists or medical and dental corpsmen — who *want* to be members of the Navy team, are much more valuable than those individuals who were drafted and have no desire to be part of that team. Also, the recipients of our services can be expected to be happier, more satisfied and more content when they know that we are here because we want to be and because we like what we are doing. For this basic reason, we must make every effort to become an all volunteer force regardless of what happens to the draft. To achieve this goal, we must dignify each and every task required in the practice of our occupations. We must improve the image of our occupation within and without the military services. Increased compensation is an integral portion of this goal, but personal satisfaction is more important and I do not overlook the attitude of an individual's family in achieving it.

My third goal is increased efficiency and it overlaps

This presentation was given by Richard S. Wilbur, M.D., Assistant Secretary of Defense for Health and Environment, to students in the Second Navy Physician's Aid Screeners Course at the Naval Medical School, NNMC, Bethesda, Md., on 16 Feb 1972. The address is reprinted here through the courtesy of Dr. Wilbur and the Naval Medical School.

the others. I am talking about quality and quantity of clerical assistance to the professionals, new equipment, improved facilities, more examining rooms per physician, more dental chairs per dentist. More and better trained ancillary personnel — physician's assistants, dental assistants, pediatric nurse practitioners, nurse clinicians and screeners, such as you in this class. I am concerned anytime a physician, dentist, nurse or corpsman performs a task that another with less training can perform as well or better. In other words, I believe that the physician should do only those tasks that require a physician's special skills, I believe that the dentist should do only those tasks that require a dentist's special skills and likewise I believe that the screener should do only those tasks that require his special skills.

Let us see how these goals fit into this course. Your class of screeners is one of the areas that I have been addressing. The purpose of your training is to create a more specialized corpsman — one who can accomplish some of the time-consuming tasks that have traditionally been reserved for the physician. As screeners, you will report to the chief of the outpatient service. Your duties have been likened to those of triage in that you will make the initial contact with the patient either in person or by phone. In this position, you will examine and sort patients, direct their movement, obtain necessary tests and refer them to the proper clinic. You, as screeners, are in a unique position in that you will have the first contact with the patients. You are in a position to influence the patient's degree of satisfaction with the service he receives. You will be dealing with the sick, the slightly sick and the worried well. As such you should expect the patients to be somewhat upset, a little nervous and somewhat frightened. By setting the patient at ease through the proper attitude, demeanor, patience and skill, you will become a most important element in the patient's feeling of satisfaction in the care he receives. The success of your program should enable the physicians in the clinics to spend more time with patients who really need their medical attention. This in turn should give physicians greater job satisfaction and patients should be more satisfied with their care. Even the worried well will be reassured and will feel better. Additionally, you will be contributing to Admiral Zumwalt's program of reducing time spent in waiting lines.

I want you to be fully aware of your part in my program and I want you to know that your skills will be recognized by other members of the health team. There has been an ad hoc committee in my office looking into the physician's assistant concept. Incidentally, I have determined to broaden this committee's function to cover all allied medical education as a means of bringing the Navy more and better trained corpsmen such as are represented by you in this class. I would hope that eventually all enlisted medical training courses, regardless of specialty, will have appropriate academic approval so that an individual who has satisfactorily completed the course and obtained the required experience might utilize his skills anywhere in the United States, in or out of the military; also that he might use it as a portion of his training for any further steps in a health care career — without the need to go back and start all over again from the beginning.

Dr. Wilbur, Assistant Secretary of Defense (H & E) (right), chats with RADM F.P. Ballenger, MC, USN, Commanding Officer, NNMC (left), and CAPT E.J. Rupnik, MC, USN (center), CO Naval Medical School, NNMC, Bethesda.

You as an individual, as a Navy Corpsman, and as a future screener will be the vital link between the patient and our health service. The dedication, enthusiasm and hard work of each of you is necessary to accomplish the goals I set forth earlier: High quality health care, All volunteer force, and Increased efficiency. Again, may I express my personal pleasure in being able to share these views with you. I wish each of you every success in this course and in your chosen career in the Navy.

THE HEMATOLOGISTS' CORNER

IRON METABOLISM

By LT Keenan F. Barber, MC, USN, and CAPT Richard A. Burningham, MC, USN; The Hematology/Oncology Branch, Medical Service, Naval Hospital, Philadelphia, Pa.

It is the purpose of this communication to review briefly the metabolism of iron and its relevance to two particular disease states: iron deficiency anemia and hemochromatosis. In understanding iron metabolism one must consider iron absorption and excretion, its distribution in the body, certain concepts about its transport (including patterns of iron and iron-binding capacity), and at least a few facts about iron kinetics and their usefulness in clinical hematology.

IRON KINETICS

Iron Absorption

In 1968, Bothwell and Carlton discussed iron absorption as being affected by luminal and mucosal factors. Luminal factors included hydrochloric acid and pancreatic secretions. Mucosal factors included the status of iron stores and the rate of erythropoiesis. It is important to note at the onset that the body has a very limited capacity to excrete iron and a more versatile ability to vary iron absorption.

As for hydrochloric acid, it is well known that patients with histamine-fast achlorhydria absorb iron less efficiently than normals. The acid allows conversion of iron from the ferric (Fe^{+++}) to the absorbable ferrous (Fe^{++}) state and promotes its absorption in the duodenum. The degree of acidity does not alter the amount of iron absorbed; its presence plays a permissive rather than a regulatory role.

There has been mention of a hormonal factor which binds iron and inhibits its absorption. This factor is felt to be decreased in patients with hemochromatosis and iron deficiency anemia. However, in studies involving achlorhydric patients, iron absorption was the same in the presence of: 1) normal gastric juice, 2) hydrochloric acid of similar normality, or 3) gastric juice from patients with iron deficiency anemia.

Concerning pancreatic factors, suffice it to say that there is increased iron absorption in pancreatic insufficiency of many etiologies, especially that related to

---

The opinions expressed herein are those of the authors and cannot be construed as reflecting the views of the Navy Department or of the naval service at large.

alcoholism. It is thought that the "mucosal block" mechanism, which relates to ferritin content in the mucosal cell and iron absorption is somehow bypassed.

The mucosal factors are perhaps better understood. When the rate of erythropoiesis in the marrow is increased, so is the rate of iron absorption. This helps to explain the iron overload that is seen in patients with chronic hemolysis. Other situations associated with increased erythroid activity and increased iron absorption include iron deficiency states, megaloblastic anemia and certain refractory anemias when erythroid hyperplasia is present.

The other well documented mucosal factor is that related to the serum iron concentration. When the serum iron is low, as in pregnancy, childhood, blood loss situations and iron deficiency, the rate of absorption of iron is increased. There is approximately a 24-hour lag in this mechanism, probably relating to the time necessary for a mucosal cell to migrate to a functional position in the gut lumen. This ability of the mucosal cell to take in iron appears to be related to the amount of storage iron (ferritin) contained in the mucosal cell. The amount of ferritin in the developing mucosal cell is in turn influenced by the need of iron for erythropoiesis at the time. The greater the need for iron to produce red cells, the less ferritin in the mucosal cell and the more iron absorbed. Although the term "mucosal block" is still used to describe this phenomenon, the term "ferritin curtain" has been proposed by Harris and Kellermeyer. Other situations in which an increased iron absorption is noted are: 1) presence of an increased iron-binding capacity, 2) hypoxia, and 3) large amounts of iron presented to the gut. Endotoxins will depress the rate of iron absorption, and the presence of infection often dampens a patient's response to iron therapy.

Iron exists in foods mainly as ferric hydroxide complexes, trivalent iron directly bound to proteins, amino acids, and protein complexes of organic acids or heme iron. Organic as well as inorganic iron is reduced to the divalent form for absorption. It has now been shown that the mechanism for heme iron (organic iron) absorption by the mucosal cells differs from that of ionic iron (inorganic iron) and is influenced by different factors. One example of this phenomenon is the influence of ascorbic acid. It has been well established that when ascorbic acid is given in large amounts, absorption of ionic iron is enhanced. This is in part due to the ability of ascorbic acid to reduce iron from the trivalent to the bivalent form, but also ascorbic acid forms a soluble ascorbate chelate which remains soluble in high pH media (as in the distal duodenum). On the other hand, heme iron absorption is not enhanced by ascorbic acid, inhibited by phytates, or influenced by the addition of hydrochloric acid in achlorhydric states.

All in all, the matter of iron absorption is quite involved and complex, and only two generalizations can be made which have experimental as well as clinical support: iron deficient patients absorb more iron than normal, and; when red cell formation is stimulated, iron absorption is greater than normal.

Dietary Iron and Iron Excretion

An average Western diet contains between 10 and 18 mg of elemental iron. Five to ten percent of this is absorbed, depending on body needs. Liver and muscle are better sources of iron than eggs or leafy vegetables. Wheat, corn and black beans contain no available iron. The presence of phosphates in the diet will decrease iron absorption. The diet of the Bantu natives, on the other hand, may contain up to 100 mg of elemental iron. This is attributed to cooking utensils which are high in iron.

Iron excretion depends upon iron stores and diet, but averages about one mg daily. Excretory losses are limited to the gastrointestinal tract, urine, and sweat. Gastrointestinal losses account for 90 percent of iron excreted and most of this is due to sloughing of mucosal cells. Bile contains iron, but it is not known how much of the biliary iron is reabsorbed in the terminal ileum. In iron overload states, iron-laden macrophages may be found in the feces.

Urinary iron losses account for only ten percent or about 0.1 mg. The important exceptions are conditions involving intravascular hemolysis and significant losses of urinary hemosiderin, as encountered in paroxysmal nocturnal hemoglobinuria or in the presence of a cardiac valvular prosthesis.

Iron excretion in perspiration is very slight and varies little as shown in a study comparing iron content of sweat in three groups: 1) Seattle whites, 2) Venezuelan mestizos, and 3) Darban Indians working ten hours a day in a laundry. The last two groups were found to perspire excessively, but the iron sweat losses were similar in all three groups.

Iron Distribution in the Body

Of the two to four grams of iron in the body, about 65 percent is incorporated into hemoglobin in the red cell. Four percent is found in myoglobin in muscles. The bulk remaining is found as storage iron in ferritin and hemosiderin. Ferritin is the primary storage form for iron. Hemosiderin is more heavily saturated with iron and contains nearly half of the storage iron. Transferrin, a beta-1-globulin, carries iron in the

bloodstream, and is usually one-third saturated. The small amount of iron remaining is found in the important heme-containing enzymes such as cytochromes, catalases and peroxidases which make oxygen available for intracellular oxidation via the electron transport system.

It is important to consider some of the patterns of iron and total iron-binding capacity that are commonly seen. Situations where a low serum iron is found would include: 1) iron deficiency, 2) pregnancy, 3) increased erythropoietic activity such as following hemorrhage or in severe megaloblastic anemia under treatment, and 4) infection or malignancy where there is an increase in the affinity for iron by the reticuloendothelial system. Items one and two above will also be associated with an increased iron-binding capacity. Serum iron may be elevated in: 1) primary hemochromatosis, 2) a patient receiving many transfusions, 3) hemolytic states, 4) untreated megaloblastic anemia, 5) severe liver injury, and 6) aplastic anemias, idiopathic or induced by drugs. Both a low serum iron and binding capacity is found in the anemia of chronic disorder which is generally associated with some form of chronic inflammatory process (rheumatoid arthritis, ulcerative colitis or malignancy, for example.)

Iron Kinetics

Serum iron and iron-binding capacity patterns give a somewhat static picture of iron metabolism. A more dynamic view can be obtained through the use of radioactive iron. When radioactive iron is added to plasma *in vitro*, the iron is chelated to the unsaturated iron-binding protein. This complex is then injected intravenously and a number of determinations can be made by appropriate sampling, or by employing externally-applied scintillation counters.

In the normal individual the rate of disappearance of the labeled iron-protein complex can be determined by serial sampling. There is a rapid exponential decrease of the radioactive iron with 50 percent of the iron being cleared from the plasma in 60-120 minutes. The clearance is particularly rapid (or less than 60 minutes) in iron deficiency states, hemolytic anemias, polycythemia vera, and infections. The clearance is prolonged (or greater than 120 minutes) in hypoplastic states of diverse etiology. External counting of the radioactive iron has shown that virtually all the injected iron moves rapidly from the plasma to the marrow. As this iron leaves the plasma and accumulates in the marrow, the counting rates over the sacrum (representing an active marrow area) increase, while the counting rates over the liver, spleen and precordium gradually decrease. The iron remains in the marrow for approximately 24 hours, then gradually leaves the marrow over the next four to six days and simultaneously appears in the circulating red cells. In the normal individual, approximately 80 percent of the injected radioactive iron will appear in the peripheral red cells in eight to ten days. This is referred to as the iron utilization. Again, in certain disease states, the utilization time will be altered. In iron deficiency states and polycythemia the radioactive iron will rapidly appear in the circulating red cells, with 80 percent of the iron appearing in the red cells by four to six days. In hemolytic states the radioactive iron appears early in the red cells, but, because of hemolysis, the iron does not remain in the red cells and will not accumulate to levels described above. In hypoplastic states the appearance of iron in the circulating red cells is markedly delayed over several days and the percent of iron utilized remains low. By various mathematical manipulations other and very important information can be obtained, such as, plasma iron turnover (PIT), marrow iron-transit time (MITT), and so on.

Ferrokinetic measurements have yielded valuable information concerning the pathophysiology of bone marrow function and iron transport in a wide variety of disorders.

IRON DEFICIENCY ANEMIA

The prevalence of iron deficiency ranges from less than three percent in all men and 10 to 30 percent in all women. A study by Scott and Pritchard in 1967 revealed that 24 percent of a group of 114 young healthy college women had no stainable iron in their bone marrow. Iron deficiency is also common in pregnant women, and in infants at one year of age.

Causes of iron deficiency include: 1) gastrointestinal bleeding, 2) repeated pregnancies or heavy menses, 3) malabsorption associated with chronic diarrhea, and 4) inadequate diet — a very rare cause of iron deficiency and usually related to starch ingestion or other idiosyncratic diets.

In almost every case, gastrointestinal bleeding should be considered the cause of iron deficiency until disproved by complete X-ray studies, proctosigmoidoscopy, stool examinations for occult blood, and if necessary, gastroscopy and esophagoscopy. The specific causes of iron deficiency are well covered in most textbooks and range from hemorrhoids, to esophageal varices, too frequent blood donation, and rarer causes, such as paroxysmal nocturnal hemoglobinuria, or other conditions associated with chronic intravascular hemolysis associated with large amounts of hemosiderin in the urine.

An average iron loss of approximately 400 to 500 mg during pregnancy is accounted for by placental iron (100 mg), fetal iron (250 mg), and iron loss at delivery (75 mg, or 250 mg during cesarean section). Lactation accounts for a loss of one to two mg of iron per day. It is important to note that except in rare cases, the placenta supplies iron to the fetus even at the expense of the mother, so that neonates are seldom iron deficient.

Iron deficiency in the post-gastrectomy patient merits special consideration. Blood loss is the most common cause and must be diligently sought. Malabsorption is a rare cause of iron deficiency (less than ten percent) in the post-gastrectomy state, but when present will usually respond to oral iron therapy. Occasionally ascorbic acid may be helpful and parenteral administration of iron is rarely necessary.

The clinical manifestations of iron deficiency include: 1) nonspecific complaints of anemia, 2) skin changes such as vitiligo in Negroes, angular stomatitis and glossitis, 3) pica and pagophagia, 4) various gastrointestinal complaints, and 5) nail changes such as decreased luster, brittle nails and longitudinal ridging. Koilonychia (spoon nails) and chlorosis are associated with advanced anemia and are rarely seen. Paresthesias are present in 25 percent of patients.

Laboratory studies which are most helpful are the peripheral blood smear, serum iron and iron binding capacity, and bone marrow examination for iron content. Red cell indices may be helpful. Osmotic fragility is usually increased and there may be a thrombocytosis.

Therapy is directed at correcting the anemia and iron stores and, more importantly, finding and treating the etiology. Shotgun therapy is to be deplored. Oral preparations include ferrous sulfate, fumarate, or gluconate. Three hundred mg of ferrous sulfate contain approximately 60 mg of elemental iron and ten percent of this (six mg) will be absorbed. If administered three times a day, 18 mg should be absorbed. Although slightly better absorbed when taken before meals, the iron is usually better tolerated when taken with or after meals and the decrease in absorption is negligible.

Failure to respond to oral iron may occur for several reasons: 1) most commonly, the patient is not taking the pills and to determine this, one may wish to examine a stool specimen for the characteristic dark metallic green color; 2) the diagnosis may be in error; 3) the patient may have gastrointestinal bleeding; 4) an ongoing infection may blunt the response to oral iron, and; 5) rarely, there may be malabsorption of iron.

The indications for parenteral iron are few and include: 1) malabsorption of diverse etiology, 2) inability to tolerate oral preparations which may occur in pregnancy and peptic ulcer disease, 3) prolonged and severe bleeding as may occur in patients with hereditary telangiectasia, and 4) failure to respond to oral iron over a long period of time.

Preparations for parenteral use include saccharated iron-oxide and iron dextran complex for intravenous administration. Iron dextran and iron sorbitol-citric acid are given intramuscularly. The formula for calculating the dosage necessary to replace 50 percent of iron stores is usually given as normal hemoglobin minus patient's hemoglobin X 0.255 = grams iron necessary. For example a patient with nine gm per 100 ml hemoglobin would need 15 gm/100 ml (normal hemoglobin) minus 9 gm/100 ml X 0.255 = 1.5 gm of iron. One cc of Imferon contains 50 mg elemental iron, so the patient would require 30 cc Imferon ($1.5 \text{ gm} \times \frac{1000 \text{ mg}}{1 \text{ gram}} \times \frac{1 \text{ cc Imferon}}{50 \text{ mg iron}}$). This could be accomplished by injecting three cc in each buttock weekly for five weeks.

Several studies have shown that for practical purposes, the rates of hemoglobin regeneration do not differ significantly when iron is administered in adequate amounts by either the oral or parenteral route. Rapidity of hemoglobin generation is not a valid reason for employing parenteral preparations. It must also be remembered that iron injections are painful and associated with significant side effects, both local and systemic (chills, bronchospasm, arthralgias, urticaria, adenopathy, flushing, hypotension, and dizziness).

PRIMARY IDIOPATHIC HEMOCHROMATOSIS

The basic defect in idiopathic hemochromatosis is thought to be an increase in iron absorption to greater than 3.5 mg per day (as shown by Fe^{59} absorption studies). Iron kinetic studies with surface counting have shown there is also an increased uptake into storage pools, especially the liver, in preference to marrow. Bone marrow iron stores are slightly increased, while liver biopsy specimens are heavily iron-stained. The serum iron is always elevated and the iron-binding capacity is usually greater than 80 percent saturated.

The disease is not clinically evident until 40 to 60 years of age when iron stores are 20 to 40 gms (normal 1 to 2 grams). The disease appears in men 20 times more frequently than in women, perhaps because menses delays or obviates iron accumulation. In the small percentage (four percent) of patients who develop the disease before 30 years of age, the clinical course is often fulminant.

Williams and Sherlock reported 40 cases of idiopathic hemochromatosis. Sixteen presented with classic symptoms of diabetes, increased pigmentation, and hypogonadism. Fourteen presented with upper

abdominal pain. All patients had hepatomegaly, 31 had marked skin pigmentation, 26 had diabetes, and 31 had gonadal atrophy. The percent saturation of transferrin was greater than 80 percent in all patients. Liver biopsy specimens showed markedly increased iron stores and cirrhosis in all but two patients.

These patients were treated with venesection. Improvement was noted by decreasing insulin requirements, improvement in liver function tests, decreasing skin pigmentation, and a sense of well-being. Sherlock compared these patients with a reported group of 18 patients who were thought to comprise a comparable group, and who had received no therapy. There was a 67 percent mortality in the untreated group as compared to eleven percent in Sherlock's group. The life expectancy in the untreated group was 4.5 years as compared to eleven years in the treated group.

Hepatoma was the most common cause of death in Sherlock's group. Repeat biopsy examination of the liver in the treated patients showed no immediate change in the cirrhosis; however, examination of serial five year follow-up biopsies showed marked improvement. There was no improvement in gonadal complaints.

SUMMARY

The aspects of iron absorption, excretion and distribution in one body must be considered for a complete survey of iron metabolism. Radioactive iron may be used to study absorption, clearance of iron injected into the plasma, and uptake in different tissues by surface counting. Some clinical aspects of iron deficiency and hemochromatosis are reviewed.

REFERENCES

1. Bothwell TH, Carlton RW: Current concepts of iron balance. Plenary Session Papers, XII Congress of Internal Society of Hematology, New York, 1968.

2. Committee on Iron Deficiency: Iron Deficiency in the U.S. JAMA 203:407, 1968.

3. Dacie JV, Lewis SM: Practical Hematology. 4th ed, New York, Grune and Stratton Inc, 1968.

4. Davis PS, Luke CG, Diller DJ: Reduction of gastric iron binding protein in hemochromatosis: a previously unrecognized defect. Lancet 2:1431, 1966.

5. Gross F (ed): Iron Metabolism — An International Symposium. Berlin, Springer-Verlag OHG, 1964.

6. Harris J, Kellermeyer R: The Red Cell. Cambridge, Harvard University Press, 1970.

7. Manis J, Schacter D: Active transport of iron by the intestine. Am J Physiol 203:73, 1967.

8. Monsen ER, Kuhn IN, Finch CA: Iron status of menstruating women. Am J Clin Nutr 20:842, 1967.

9. Scott DE, Pritchard JA: Iron deficiency in healthy college women. JAMA 199:897, 1967.

10. Stanbury JB, Wyngaarden JB, Frederickson DS: The Metabolic Basis of Inherited Disease. 2nd ed, New York, McGraw-Hill Book Co, 1960.

11. Williams R, et al: Venesection therapy in idiopathic hemochromatosis. QJ Med 38:1, 1969.

TERMITE RESEARCH

Navy research on how to destroy termite colonies completely without the use of insecticides is another example of how the Navy is trying to improve habitability.

The immediate target is the Formosan termite which heavily infests Hawaii where there are several Naval installations. This species has also found its way to the continental U.S.

Insecticides, aside from their potential danger to the environment, are limited in their effectiveness against the Formosan termite. It has been found that these termites are in many cases able to reinfest a structure after an insecticide treatment, by walling off sections of the colony where insecticides are applied.

The technique under development by the University of Hawaii under a contract with the Office of Naval Research is to introduce a deadly disease capable of reaching epidemic proportions among the termites in a colony.—Washington, D.C. (NAVNEWS).

SKYLAB FLIGHT CREWS NAMED

Flight crews for Skylab — the U.S. first earth-orbiting space station — have been announced.

The Skylab orbited workshop will be launched unmanned in the Spring of 1973 and will be visited three times by three-man crews over an eight-month period.

Each Skylab crew will consist of a commander, a science pilot, and a pilot. Four Naval officers are listed among the prime crews.

Aboard the first manned visit lasting 28 days will be CAPT Charles Conrad, Jr.; CDR Joseph P. Kerwin, MC; and CDR Paul J. Weitz. Conrad has flown on Gemini 5 and 11 and Apollo 12 — the second manned lunar landing.

Navy crewmen on the second mission lasting 56 days will be CAPT Alan L. Bean, who served as lunar module pilot on Apollo 12.

No Navy officers are slated for the third mission.—Washington, D.C. (NAVNEWS).

Interruption of the Aortic Arch Without a Patent Ductus Arteriosus

By CAPT Jacob R. Morgan, MC, USN; LCDR Alan D. Forker, MC, USNR; CAPT Richard G. Fosburg, MC, USN; CDR M. Ken Neugebauer, MC, USN; CDR Albert K. Rogers, MC, USN; and CDR Carl R. Bemiller, MC, USN;* Naval Hospital, San Diego, California 92134.

The following article originally appeared as follows: Interruption of the Aortic Arch Without a Patent Ductus Arteriosus, CIRCULATION, XLII: 961-965, Nov 1970. The paper is reproduced here by permission of the American Heart Association, Inc., and the authors.

Prior to 1964, interruption of the aortic arch as an isolated anomaly was thought to be incompatible with life.[1] In that year Pillsbury and associates[2] reported the first case without an associated patent ductus arteriosus. The second case was described by Zetterqvist in 1967.[3] The purpose of the present paper is to describe the third case of interruption of the aortic arch without a patent ductus arteriosus and to review the surgical results with this anomaly.

Report of a Case

C.H., a 19-year-old, active duty sailor, was referred to the Naval Hospital, San Diego, for evaluation of a possible carotid aneurysm. He had been aware of prominent bilateral neck pulsations all of his life. He was entirely asymptomatic and could exercise strenuously without leg or arm claudication, headaches, or symptoms of cerebrovascular insufficiency. The family history was negative.

Physical examination revealed a well-developed, muscular male with no cyanosis or clubbing. Cuff blood pressure in both arms and legs was 95/70 mm Hg. Both carotid pulses were bounding, whereas both radial, brachial, and femoral pulses could not be felt. No precordial lift or thrill was palpable. The first and second heart sounds were normal, and no extra sounds were audible. A grade II/VI, systolic ejection murmur was present in the aortic area; this murmur became less intense along the left sternal border and apex. Prominent systolic carotid bruits were present: grade III/VI on the right, grade II/VI on the left. The most prominent bruit was heard over the left posterior occipital area, where it was grade IV/VI behind the left ear and grade II/VI behind the right ear. A grade II/VI systolic bruit was heard over the upper thoracic spine, where it spilled briefly past the second heart sound. The remainder of the examination was negative.

The electrocardiogram was normal.

*Current address: Naval Hospital, Philadelphia, Pa.

The opinions or assertions contained herein are those of the authors and are not to be construed as official or reflecting the views of the Navy Department or the naval service at large.

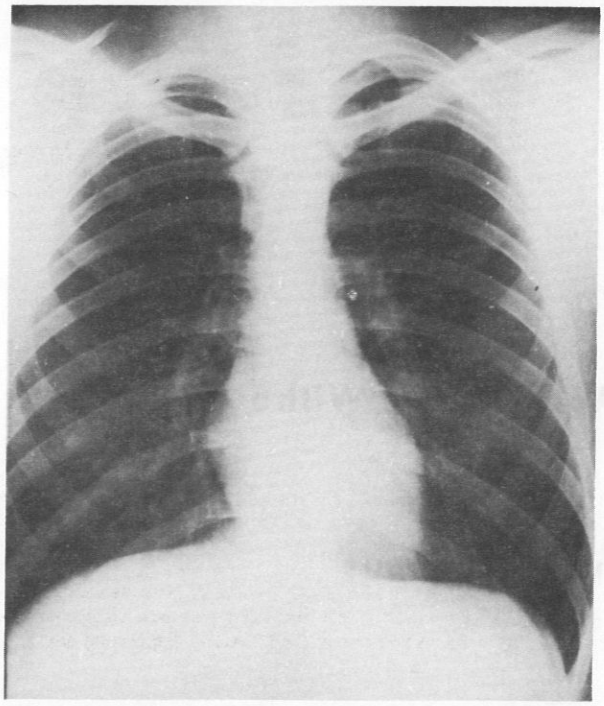


Figure 1.—Preoperative thoracic roentgenogram. Absence of an aortic knob; no descending aorta or rib notching is visible.

A thoracic roentgenogram (Figure 1) revealed a normal-sized heart with no visible aortic knob, descending aorta, or rib notching. A barium swallow showed, in the lateral projection, a posterior indentation of the esophagus compatible with an aberrant right subclavian artery.

The clinical diagnosis was coarctation of the aorta involving the origin of the left subclavian artery with an aberrant right subclavian artery, with or without a cervical aorta or other anomaly of the aortic arch.

Catheterization was attempted from the right groin, plus the right and left brachial arteries. The right heart pressures were normal, that is, pressure in the right atrium was 6 mm Hg mean, pressure in the right ventricle was 25/6 mm Hg, and pulmonary artery pressure was 25/15 mm Hg. Normal oxygen saturation data, indocyanine-green dye curves, and a hydrogen inhalation study excluded shunts. A Brockenbrough transseptal catheter accidentally entered the ascending aorta instead of the left atrium; withdrawal of the catheter with surgical stand-by was uneventful. A damped pressure in the ascending aorta was 130/80 mm Hg. Pressure in the descending aorta, femoral artery, and right subclavian artery was 95/70 mm Hg. The catheter from the femoral artery could not be passed around the aortic arch; it always went into the left side of the neck. Injection of contrast material showed the direction of blood flow to be from the neck vessels to the descending aorta. Catheters from both the right brachial and left brachial arteries would only go down the descending aorta. A pulmonary artery angiogram, made by using a single plane Sanchez-Perez film changer, demonstrated huge right and left common carotid arteries arising from the ascending aorta (Figures 2A and B), but no definite connection was seen between the ascending and descending aorta. Both subclavian arteries and the descending aorta filled late, by retrograde flow through the vertebrals, after a large number of collateral vessels were seen in the left neck region (Figure 2C).

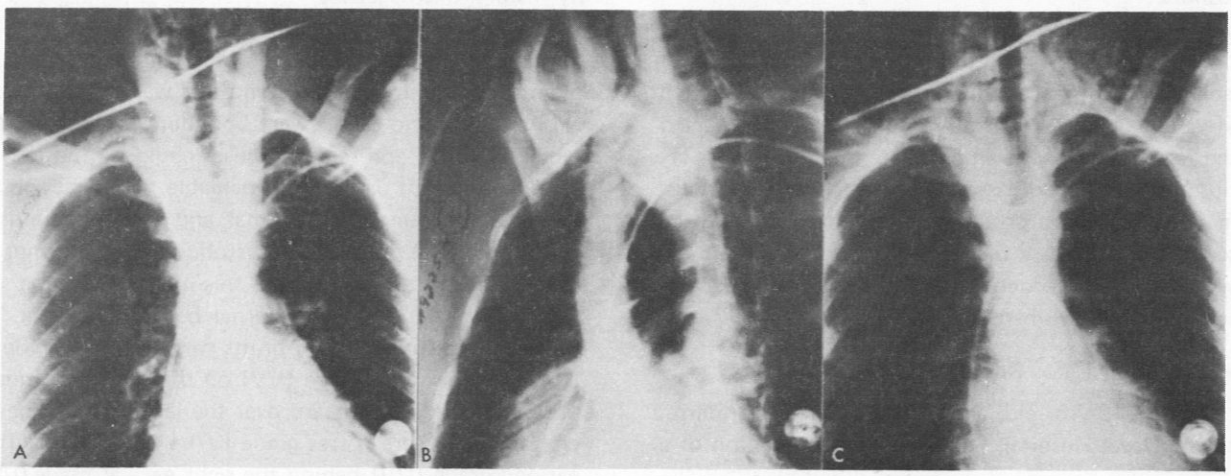


Figure 2.—Pulmonary artery angiograms. (A) Posteroanterior view 4 sec after injection. Large bilateral common carotid arteries seen, without an aortic arch or descending aorta. Collateral vessels just starting to fill in left neck region. (B) Oblique view 4 sec after injection. Descending aorta is faintly visualized, but no definite connection is seen with ascending aorta. (C) Later film. Demonstrates many large collateral vessels in the left neck region.

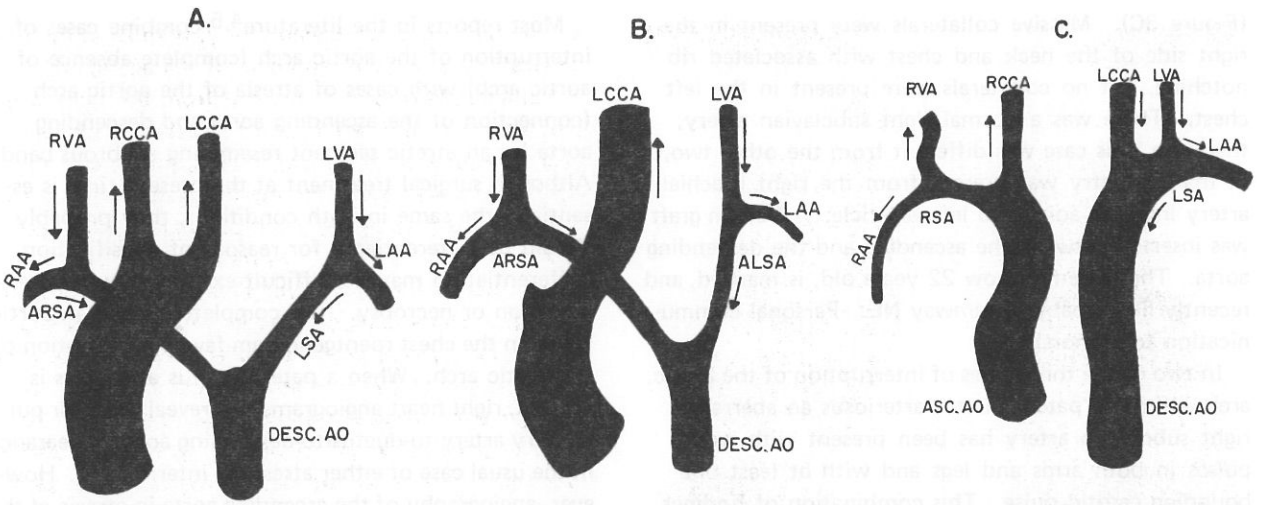


Figure 3.—Schematic drawings of the 3 cases without patent ductus arteriosus. (A) Present case: Interruption beyond the left common carotid artery with an aberrant right subclavian artery. (B) Case of Zetterqvist (1967):[3] Similar to the present case, except that the right common carotid artery is absent. (C) Case of Pillsbury and associates (1964):[2] Interruption between the right and left common carotid arteries.

Abbreviations: ALSA and ARSA = anomalous left and right subclavian arteries; LVA and RVA = left and right vertebral arteries; LAA and RAA = left and right axillary arteries; LCCA and RCCA = left and right common carotid arteries; LSA and RSA = left and right subclavian arteries; ASC.AO = ascending aorta; DESC.AO = descending aorta.

Surgical Procedure

A left anterolateral thoracotomy with extension across the sternum was performed. There was complete anatomic separation of the arch of the aorta between the left common carotid and left subclavian artery. The descending aorta arose at the junction of the aberrant right subclavian and left subclavian arteries and was physically separated from the ascending aorta by about 10 cm. A prominent ligamentum arteriosum was present between the pulmonary artery and the descending aorta at the left of the left subclavian artery. The left recurrent laryngeal nerve looped around the ligamentum arteriosum in normal fashion. The descending aorta was thinned and considerably more friable than normal. A 10-mm knitted Dacron bypass graft was inserted between the ascending and descending aortas, utilizing partial occluding clamps. Cardiopulmonary bypass was unnecessary. Initially the graft was inserted anterior to the phrenic nerve, but kinking required revision with transfer of the graft to a position posterior to the phrenic nerve. The postoperative course was uneventful. Foot pulses were noted immediately after surgery.

Two weeks after surgery, the left arm blood pressure was 115/90 mm Hg. Results of cardiac examination were unchanged, except that the systolic carotid and cranial bruits had decreased in intensity. Strong left radial and bilateral dorsalis pedis pulses were present, but the right radial and both femoral pulses continued to be damped. The postoperative thoracic roentgenogram now showed a prominent aortic knob.

Discussion

In 95% of the reported cases of interruption of the aortic arch, a ventricular septal defect has been present.[4,5] Except for the cases reported by Zetterqvist,[3] Pillsbury and associates,[2] and the present case, a patent ductus arteriosus has always been present. In atresia of the aortic arch, which is included in most series with interruption of the aortic arch,[4,5] a patent ductus arteriosus has always been present, except in the case described by Evans at necropsy.[6]

In the present case of a 19-year-old youth, there was interruption of the aortic arch after the left common carotid artery and an aberrant right subclavian artery was present (Figure 3A). There was also a well-developed collateral system in the left neck region.

Zetterqvist[3] described an eight-year-old boy with interruption of the aortic arch beyond the left common carotid artery (Figure 3B). The right common carotid artery was absent, but an aberrant right subclavian artery was present. No remarkable collateral system was visualized in the neck or thorax. The ascending and descending aortas were approximated by side-to-end anastomosis without need of a prosthetic graft. This boy was doing well one year postoperatively.

In the first published case by Pillsbury and associates,[2] a 16-year-old girl had interruption of the aortic arch between the right and left carotid arteries

(Figure 3C). Massive collaterals were present in the right side of the neck and chest with associated rib notching, but no collaterals were present in the left chest. There was a normal right subclavian artery; therefore, this case was different from the other two, in that an entry was present from the right brachial artery into the aorta and left ventricle. A Dacron graft was inserted between the ascending and the descending aorta. The patient is now 22 years old, is married, and recently had a baby (Shumway NE: Personal communication to authors).

In two of the three cases of interruption of the aortic arch without a patent ductus arteriosus an aberrant right subclavian artery has been present with weak pulses in both arms and legs and with at least one bounding carotid pulse. This combination of findings should suggest the possibility of interruption of the aortic arch.

The embryologic background of the present case is presumed to be bilateral regression of the fourth aortic arches with bilateral persistence of the dorsal aortas. The right fourth aortic arch normally develops into the proximal part of the right subclavian artery; regression is responsible for the aberrant right subclavian artery. The left fourth aortic arch forms the segment of the aortic arch between the left common carotid and the left subclavian artery; regression is responsible for the interruption of the aortic arch following the left common carotid artery.

Most reports in the literature[4,5] combine cases of interruption of the aortic arch (complete absence of aortic arch) with cases of atresia of the aortic arch (connection of the ascending aorta and descending aorta by an atretic segment resembling a fibrous band). Although surgical treatment at the present time is essentially the same in both conditions, they probably should be differentiated for reasons of classification. Differentiation may be difficult except by surgical exploration or necropsy. The complete lack of an aortic knob on the chest roentgenogram favors interruption of the aortic arch. When a patent ductus arteriosus is present, right heart angiograms will reveal a similar pulmonary artery-to-ductus-to-descending aorta appearance in the usual case of either atresia or interruption. However, angiography of the ascending aorta in atresia of the aortic arch may give some indication of the beginning curve of an aortic arch. In cases of complete interruption of the aortic arch, there should be no indication at all of the beginning curve of an aortic arch; the direction of the ascending aorta is straight superiorly.

A total of 160 cases of interruption and atresia of the aortic arch (including those with a patent ductus arteriosus) have now been reported, with over half of these cases having complete interruption of the aortic arch (Table 1).[1,4,8] Most of these cases have been diagnosed at necropsy, with only 24 cases of interruption of the aortic arch and 12 cases of atresia of the aortic arch diagnosed during life. Surgery has been

Table 1.—Review of Reported Cases of Interrupted or Atretic Aortic Arch

	No. of Cases	Surgery		Survival	Surgery
		*I	A	I	A
Previous cases[4,5,7]	111	8	4	4	4
Tawes, et al.[7]	21	–	9**	–	4†
McNamara & Rosenberg[8]	17	–	–	–	–
Rochette, et al.[9]	7	5	–	0	–
Rainer[10]	1	–	1	–	1
Zetterqvist[3]	1	1	–	1	–
Pilapil, et al.[11]	1	–	–	–	–
Present case	1	1	–	1	–
Total	160	15	14	6	9

*Abbreviations: I = interrupted arch; A = atretic arch.

**Two patients died before definitive procedure was performed.

†Two late deaths.

attempted on a total of 15 patients with interruption of the aortic arch, with six patients surviving surgery; 14 patients with atresia of the aortic arch have been operated with nine patients surviving surgery. Of the total of 15 survivors of surgery for both interruption and atresia, four have been eight years of age or older (the three cases of interruption of the aortic arch without a patent ductus arteriosus and the one case of atresia of the aortic arch with a patent ductus arteriosus).[10] The operative risk in the younger age group in either interruption or atresia of the aortic arch is still extremely high.[9]

REFERENCES

1. Roberts, W.C.; Morrow, A.G.; Braunwald, E.: Complete Interruption of the Aortic Arch. Circulation 26:39, 1962.

2. Pillsbury, R.C.; Lower, R.R.; Shumway, N.E.: Atresia of the Aortic Arch. Circulation 30:749, 1964.

3. Zetterqvist, P.: Atypical Coarctation of the Aorta with Bilateral Vertebral-Subclavian Pathway. Scand J Thorac Cardiovasc Surg 1:68, 1967.

4. Moller, J.H.; Edwards, J.E.: Interruption of the Aortic Arch: Anatomic Pattern and Associated Cardiac Malformation. Amer J Roentgenol 95:557, 1965.

5. Lie, J.T.: The Malformation Complex of the Absence of the Arch of the Aorta: Steidele's Complex. Am Heart J 73:615, 1967.

6. Evans, W.: Congenital Stenosis (Coarctation), Atresia, and Interruption of Aortic Arch. Quart J Med (NS) 2:1, 1933.

7. Tawes, R.L.; Panagepoules, P.; Aberdeen, E.; et al.: Aortic Arch: Experience in 11 Cases of Operation. J Thorac Cardiovasc Surg 58:492, 1969.

8. McNamara, D.G. and Rosenberg, H.S.: Interruption of the Aortic Arch. Paediatric Cardiology, ed. by Hamish Watson. St. Louis, C.V. Mosby Co., 1968, p 224.

9. Rochette, M.; Stanley, P.; Ethier, M.; et al.: Complete Interruption of the Aortic Arch in Infancy. Can Med Assoc J 98:131, 1968.

10. Rainer, W.G.: Discussion. J Thorac Cardiovasc Surg 58:500, 1969.

11. Philapil, V.R. and Watson, D.G.: Differential Pulse Pressure: A Case Associated with Complete Interruption of the Aortic Arch with Taussig-Bing Malformation. Am J Dis Child 116:448, 1968.

Navy Medical Corps' LT Henry J. MacDonald, Jr., of New Bern, N.C. accepted the Navy Surgeon General's award from RADM Oscar Gray, Jr., MC, USN, at graduation ceremonies in Dec 1971 for Naval Flight Surgeon Class 71-3 at the Naval Aerospace Medical Institute, Pensacola, Fla. Dr. MacDonald topped the 37 members of his class. He is an alumnus of Duke University, and University of North Carolina School of Medicine. RADM Gray, Jr., is Commanding Officer of the Naval Aerospace Medical Center.—PAO, Naval Aerospace Medical Center, Pensacola, Fla.

Constitutional Slow Growth With Delayed Adolescence

By CDR G. John Weir, Jr., MC, USN,* Radioisotope Laboratory, Department of Medicine, Naval Hospital Great Lakes, Illinois.

Introduction

Short stature is a symptom of many diverse disease entities. Shortness is accompanied by delayed sexual maturation in many of these entities. The internist, pediatrician and family physician, as well as the endocrinologist, must be familiar with the approach to the differential diagnosis of shortness with or without delayed sexual maturation. The case to be presented illustrates the basic approach to diagnosis and treatment of shortness and represents an extreme instance of one of the more common causes of the condition.

Case Report

JL was presented by his parents for evaluation of stature and sexual maturity. He was 15 and 6/12 years old and apparently in good health. The patient was the product of a normal, full-term gestation, weighing five pounds, 14 ounces. Delivery and the neonatal period were normal. The patient developed and grew normally until five or six years when it became apparent that he was shorter than his peers.

The patient experienced an episode of lead toxicity at two years of age with several hours of coma. Recovery from the poisoning was complete with no evidence of residuals. His past medical history is otherwise unremarkable. He had been partially evaluated for shortness in 1962 and 1965 but records of these evaluations and records of specific height and weight measurements at various ages had not been maintained. He has progressed normally in school, receiving average to slightly below average grades.

JL's father is 175 cm (69 inches) tall and weighs 72.7 kilograms (160 pounds). The father did not begin shaving until 20 years of age and was somewhat shorter than his peers during his early teens, however, neither he nor his parents were impressed with any abnormality. He remembered no evidence of delayed sexual maturation except for the lateness in shaving. JL's mother is 163 cm (64 inches) tall and weighs 91 kilograms (200 pounds). There is one sibling, a female, nine years old, who is 107 cm (42 inches) tall and weighs 22.7 kilograms (50 pounds). Her birth, growth and development have been normal. The paternal grandparents were both approximately 165 cm tall, the maternal grandparents 165 and 183 cm. There is no family history of notable shortness, delay in sexual maturation, endocrine abnormality or other familial illness.

Physical examination revealed a bright, active, normal-appearing black male standing 137 cm (54 inches) tall and weighing 30 kilograms (65 pounds). There was no facial, axillary or pubic hair. The ears were normally placed, there was no webbing of the

*F.A.C.P.; Director, Radioisotope Laboratory, Naval Hospital Great Lakes, Ill. 60088.

The opinions expressed herein are those of the author and cannot be construed as reflecting the views of the Navy Department or the naval service at large.

neck and the elbow carrying angle was normal. The hands and fingers were of normal size and all metacarpal heads were readily apparent. The testes were 2½ x 1½ cm, distinct and of normal consistency. The penis was juvenile in appearance. The patient measured 68 cm from crown to symphysis pubis and 70 cm from pubis to floor. Arm span was 141 cm. Careful physical examination revealed no abnormalities of the cardiac, pulmonary, central nervous or other organ systems.

Laboratory evaluation revealed a white blood cell count of 8,600/cu mm; hemoglobin 13.0 grams/100 ml; urine specific gravity 1.028, pH 6.5, albumin and sugar negative, microscopic examination normal; serum urea nitrogen 19 mg/100 ml; serum creatinine 0.8 mg/100 ml; serum concentrations of sodium 139 mEq/L, potassium 3.7 mEq/L, chlorides 97 mEq/L and CO_2 combining power 28 mEq/L. Serological evaluation for syphilis was negative. A screening test for glucose-6-phosphate dehydrogenase deficiency was negative as was a sickle-cell preparation. Roentgenograms of the chest and skull were normal, the sella turcica was of normal size and shape. Bone age measured by ossification centers in the hand and wrist, according to the criteria of Greulich and Pyle, was nine years.[1] Serum alkaline phosphatase was 68 milliunits/ml IU (International Units, upper limit of normal for adults is 44 IU). Thyroid uptake of I^{131} at 24 hours was 15% (normal 8-35%); the thyroid-binding index was 1.07 (normal 0.87-1.13), and; the total serum thyroxine was 12.9 mcg/100 ml (5.0-13.7 mcg/100 ml normal). Pituitary gonadotropins in a 24-hour urine specimen were positive at 6 mouse units, negative at 12. Urinary 17-hydroxycorticosteroids were 3.3 mg/24 hours prior to, 6.3 mg/24 hours on the day of, and 15.4/24 hours on the day after receiving 500 mg metyrapone every four hours orally. Serum growth hormone was 3.4-5.0 mμg/ml in the fasting, resting state. Insulin in a dosage of 0.1 units/kg of body weight, did not result in a 50% reduction in blood glucose. A repeat test, using 0.2 units/kg, resulted in satisfactory reduction in blood glucose and showed an increase in growth hormone to 14.0 mμg/ml 45 minutes after injection.

Discussion

Differential Diagnosis

Shortness of stature is a feature of an extremely diverse group of disease entities including genetic aberrations, connective tissue disorders, emotional deprivation, many chronic systemic diseases, nutritional deficiencies and endocrine imbalance — either deficiency or excess.[2,3,4,5,6,7] A number of these entities present at an early age with distinctive, often bizarre, physical abnormalities.[5] The growth retardation of emotional deprivation presents early in life, primarily in the first year or two, and can be difficult to distinguish from endocrine abnormalities and idiopathic causes of shortness.[8,9,10] The differential diagnosis of an apparently normal, but short, individual presenting in late childhood or early adolescence remains very broad. Renal, cardiovascular, pulmonary and gastrointestinal illnesses may interfere with normal growth and shortness may be associated with mental retardation. Idiopathic and endocrine causes of shortness include constitutional slow growth with delayed adolescence, familial short stature, primordial dwarfism, diabetes mellitus, excess or deficiency of corticosteroids, hyperthyroidism, sexual precocity and growth hormone deficiency, alone or accompanied by other pituitary hormone deficiencies. Shortness may also accompany abnormal sexual hormone entities such as the functional prepuberal castrate syndrome and Turner's syndrome. Sexual retardation can accompany growth retardation in nearly all causes of shortness. The presence of delayed sexual maturation eliminates sexual precocity and is not a part of primordial dwarfism but does not otherwise change the general classification and differential diagnosis.

Clinical Evaluation

The evaluation of shortness must begin with an extensive, careful history and physical examination especially designed: to delineate the patient's potential for growth as revealed by his family history; to reveal the patient's emotional environment, and; to detect underlying systemic illness which may not have resulted in other manifestations. Although most systemic causes of shortness can be delineated by the initial history and physical examination, a routine laboratory evaluation including blood counts, blood glucose, urinalysis and renal function tests is indicated. Inflammatory bowel disease can present as growth retardation several years before there is any other evidence of the illness.[11] Gastrointestinal X-ray studies are often a necessary part of the evaluation.

Historical and physical evaluation must include the relation of the patient's stature to that of his family and an evaluation of the patient's rate of growth. The use of routine growth charts may show that the patient, though short, is maintaining his relative position and is growing at a normal rate. Specific formulae and charts for evaluating a child in regard to his parents, comparing height, bone age and weight, and for evaluating rate of growth, are available and may be helpful in equivocal situations.[4] In the case of caloric

deprivation, weight retardation is greater than height or skeletal retardation.[4] In growth hormone deficiency, skeletal development is delayed but to a lesser extent than height. Growth hormone deficiency is often accompanied by a typical profile with a tendency to obesity, immature facies, normal proportions and a small penis. This appearance, however, is seen in patients with multiple pituitary deficiencies as well as in cases of isolated growth hormone deficiency and is not sufficiently characteristic to allow separation of patients with constitutional slow growth or primordial dwarfism.[12]

Ethnic differences in size and growth patterns exist, but their significance is rather restricted. Blacks and Caucasians born and raised in America have generally similar physical measurements.[13,14] There are some minor differences which, although significant in the general population, would not be significant in the evaluation of a specific patient. A difference in stem (crown to pubis) length is present which might be of importance in determining whether or not a patient is eunuchoid. Blacks tend to have a shorter stem length, and greater lower extremity length, for equal heights. Thus any eunuchoid tendency would be exaggerated in Blacks.

Consideration of Reported Case (JL)

The patient in question presents no stigmata of systemic illness by history, physical examination or laboratory evaluation. The episode of lead poisoning occurred several years before growth retardation was noted and resulted in no permanent sequelae. Lead poisoning has not been implicated as a cause of shortness. A roentgenographic study of the gastrointestinal system has not been performed but there is no evidence of impaired nutrition, no history of febrile episodes, abdominal pain, diarrhea, constipation, painful defecation or perirectal disease. The stool has not been bulky or foul and has not contained pus or mucus. Shortness has been present for at least nine years. Although inflammatory bowel disease has been implicated as the cause of shortness present for four years without abdominal symptoms,[11] it can be excluded as the cause of this patient's shortness. Evaluation of the thyroid and adrenal glands was normal and diabetes mellitus is excluded by normal blood glucose determinations. The delayed sexual maturation, retarded bone age and normal birth weight exclude primordial dwarfism as well as precocious puberty. If the lack of secondary sexual characteristics were due to a deficiency of testosterone production, one would not expect a retarded bone age and pituitary gonadotropins should be elevated. The presence of distinct, normal, although juvenile, testes is also against the functional prepuberal castrate syndrome. The patient does not present the physical characteristics of the Male Turner's syndrome. The growth hormone studies are normal; this, plus the presence of pituitary gonadotropins and the normal thyroid and adrenal studies, serves to exclude hypopituitarism, partial or complete. The history, physical examination and laboratory evaluation combined, establish a diagnosis of constitutional slow growth with delayed adolescence.

Growth Hormone Deficiency

The development of a radioimmunoassay procedure for human growth hormone has: provided the impetus for a great deal of research; enabled delineation of the metabolic effects of the hormone, and; done much to explain acromegaly, pituitary gigantism and hypopituitary dwarfism.[2,12,15,16] The exact role of the hormone in initiating and supporting growth, and in the growth spurt of adolescence, however, remains elusive. Growth hormone deficiency, or an impaired response to hypoglycemia, as well as other manifestations of hypopituitarism are frequently but not invariably seen in the emotional deprivation or failure-to-thrive syndrome.[10] Growth, even excessive growth, can occur with a deficiency of growth hormone.[17] The African pygmies are short in spite of normal growth hormone secretion, apparently as a result of diminished end-organ response.[18] Growth retardation is present in fetal malnutrition and severe renal disease even though there can be a greater than normal growth hormone response to hypoglycemia and arginine infusion.[19] Isolated growth hormone deficiency can be accompanied by delayed puberty and administration of human growth hormone to growth-hormone deficient individuals of pubertal age apparently stimulates pubertal changes.[12] Growth hormone apparently plays no role in intra-uterine growth.[2] Earlier work had failed to demonstrate any effect of growth hormone in the first one or two years of life but 18 of the 35 patients of Goodman, et al.,[12] grew slowly in the first postnatal year. Growth hormone deficiency can be the initial manifestation of multiple deficiencies of pituitary trophic hormones.[12]

Constitutional Slow Growth

Constitutional slow growth with delayed adolescence is the most common form of shortness[6,19] (excluding familial shortness). The growth retardation is seldom apparent earlier than 18 months but is always apparent prior to puberty. Growth hormone response to hypoglycemia and arginine infusion is

normal. Skeletal maturation, height and weight are affected uniformly in contrast to growth hormone deficiency cases where skeletal maturation is less affected than height. The patients or their parents also complain of anorexia and easy fatigability in some instances. The underlying abnormality responsible for the syndrome is unknown. The delay in skeletal maturation is usually two to four years and puberty commonly begins by age 16-18 years. Thus, the case presented represents an extreme form of the condition. The diagnosis is made more frequently in males than females (98 to 14 respectively, in Steiner's series[6]), but this may represent a presentational bias; shortness is simply not a problem in girls. It is of interest that although the patient's female sibling is below the third percentile in height and below the tenth percentile in weight the parents do not consider her to be small and are not inclined to have her evaluated. The condition is sometimes familial; in the present instance it is likely that the father and the sister are affected.

Treatment of Constitutional Slow Growth

Specific treatment is not available. Puberty, and an increase in growth rate can be achieved with gonadotropin administration or the use of the appropriate sex hormone. However, this may result in premature epiphyseal closure and may prevent the patient from achieving his normal height. In most cases the need for treatment depends on the psychological response of the patient and his parents to the condition. In general, treatment should be delayed as long as possible. When treatment is necessary, chorionic gonadotropins 2,000-4,000 units intramuscularly twice weekly is the preferred regimen. Treatment is continued for three to six months. A second course is sometimes necessary.[20] In males a testosterone preparation can be used.[7]

Conclusion

A case of constitutional slow growth and delayed adolescence with a six-year retardation in bone and height age is presented. The differential diagnosis and treatment of shortness and delayed sexual maturation is discussed.

REFERENCES

1. Greulich WW, Pyle SI: Radiographic Atlas of Skeletal Development of the Hand and Wrist. 2nd ed, Stanford, Stanford University Press, 1959.

2. Cheek DB, Cooke RE: Growth and growth retardation. Ann Rev Med 15:357-382, 1964.

3. Langer LO Jr: Short stature — check list of conditions associated with retarded longitudinal growth. Clin Pediatr 8:142-153, 1969.

4. Olshin IJ: Problems in growth. Pediatr Clin North Am 15:433-445, 1968.

5. Smith DW: Compendium on shortness of stature. J Pediatr 70:463-519, 1967.

6. Steiner, MM: The short child. Ill Med J 133:43-52, 1968.

7. Escamilia RF: (Ed.) Symposium on the treatment of disorders of growth and development. Mod Treat 5:137-240, 1968.

8. Shaheen E, Alexander D, Truskowski M, Barbero GJ: Failure to thrive — a retrospective profile. Clin Pediatr 7: 255-261, 1968.

9. Powell GF, Brasel JA, Raiti S, Blizzard RM: Emotional deprivation and growth retardation simulating idiopathic hypopituitarism. II Endocrinologic evaluation of the syndrome. N Engl J Med 276:1271-1278, 1967.

10. Powell GF, Brasel JA, Raiti S, Blizzard RM: Emotional deprivation and growth retardation simulating idiopathic hypopituitarism. II Endocrinologic evaluation of the syndrome. N Engl J Med 276:1279-1283, 1967.

11. McCaffery TD, Nasr K, Lawrence AM, Kirsner JB: Severe growth retardation in children with inflammatory bowel disease. Pediatrics 45:386-393, 1970.

12. Goodman HG, Grumbach MM, Kaplan SL: Growth and growth hormone. II A comparison of isolated growth hormone deficiency and multiple pituitary hormone deficiencies in 35 patients with idiopathic hypopituitary dwarfism. N Engl J Med 278:57-58, 1968.

13. Malina RM: Growth and physical performance of American Negro and White children — a comparative survey of differences in body size, proportions and composition, skeletal maturation and various motor performances. Clin Pediatr 8: 477-483, 1969.

14. Verghese KP, Scott RB, Teixeira G, Ferguson AD: Studies in growth and development. XII Physical growth of North American Negro children. Pediatrics 44:243-247, 1969.

15. Finkel MS: Human growth hormone, metabolic effects and experimental and therapeutic applications. Am J Med 32:588-598, 1962.

16. Youlton R, Kaplan SL, Grumbach MM: Growth and growth hormone. IV Limitations of the growth hormone response to insulin and arginine and of the immunoreactive insulin response to arginine in the assessment of growth hormone deficiency in children. Pediatrics 43:989-1004, Jun 1969.

17. Holmes LB, Frantz AG, Rabkin MT, Soeldner JS, Crawford JD: Normal growth with subnormal growth hormone levels. N Engl J Med 279:559-566, 1968.

18. Rimoin DL, Merimee TJ, Rabinowitz D, Cravalli-Sforza LL, McKusick VA: Peripheral subresponsiveness to human growth hormone in the African pygmies. N Engl J Med 281: 1383-1388, 1969.

19. Hillman DA, Colle E: Plasma growth hormone and insulin response in short children. Am J Dis Child 117:636-644, 1969.

20. Wilkins L: The Diagnosis and Treatment of Endocrine Disorders in Childhood and Adolescence. 3rd ed, Springfield, Charles C. Thomas, 1965, p 175.

Methoxyflurane Nephropathy

By LCDR Richard F. Cioffi, MC, USNR,
Head, Renal Branch, Medicine Service,
Naval Hospital, National Naval Medical
Center, Bethesda, Maryland.

When the nonexplosive volatile anesthetic agent, methoxyflurane, was introduced into clinical use, reports of its nephrotoxicity began to appear. As early as 1960, Artusio et al.[1] commented on the possible effects of this agent on renal function. Later Crandall and his associates[2] defined a clinical syndrome of azotemia, dehydration, and hyposthenuria occurring within 24 to 36 hours after its use. Since then, others[3-6] have reported cases of apparent renal toxicity after methoxyflurane anesthesia.

This report presents two more cases of polyuria following the use of methoxyflurane and reviews the mechanisms possibly involved.

Case Reports

Case 1.

A 69-year-old retired male naval captain was admitted to Bethesda Naval Hospital for treatment of a rectal mass found on annual physical examination. Biopsy specimen of this mass revealed adenocarcinoma. Past history and review of systems were noncontributory. Physical examination disclosed an obese elderly white man whose blood pressure was 142/60 mm Hg. The positive findings included bilateral inguinal hernias and a rectal mass.

Results of laboratory studies were: hematocrit, 41 ml/100 ml; white blood cell count, 5,000/cu mm with a normal differential; urine specific gravity 1.022, pH 5, no protein nor sugar, and a few epithelial cells noted on microscopic examination; blood urea nitrogen, 19 mg/100 ml; serum creatinine, 1.0 mg/100 ml, and; serum electrolytes were within the normal range. Liver and bone scans, intravenous pyelogram, and skull and chest X-ray studies were normal.

On the sixth day, an abdominoperineal resection was performed under Penthrane anesthesia for six hours. Administration of a bowel preparation with kanamycin for three days had preceded the operation. No hypotension occurred during the operation and the patient received one unit of matched blood. Postoperatively, the patient received penicillin for seven days and also streptomycin, 1 gram per day for five days. On the third day postoperatively, the blood urea nitrogen (BUN) was 15 mg/100 ml; serum electrolytes were within the normal range. The hematocrit was 40 ml/100 ml and the white blood cell count was 11,200/cu mm. On the fifth day postoperatively, the urine volume reached 3.8 liters per 24-hour period and the serum sodium rose to 152 mEq/liter. For the next five days, the urine volumes exceeded intake and progressively rose to 8.5 or 9 liters/day. The patient's

---

The opinions and assertions contained herein are those of the author and are not to be construed as official or reflecting the views of the Navy Department or of the naval service at large.

BUN never exceeded 21 mg/100 ml and the creatinine remained at 1.1 to 1.2 mg/100 ml. Urine specific gravities during this period were less than 1.010 despite the net negative fluid balance. Eight hours of dehydration resulted in a four-pound weight loss (3% of body weight). Urine osmolality remained less than plasma, and urine/plasma osmolality (U/P Osm) was consistently less than 1. Administration of ten units of Pitressin subcutaneously failed to alter this ratio. The response to hypertonic saline solution infusion is depicted graphically in Figure 1. A diagnosis of nephrogenic diabetes insipidus was made and the patient's protein and salt intake was restricted.

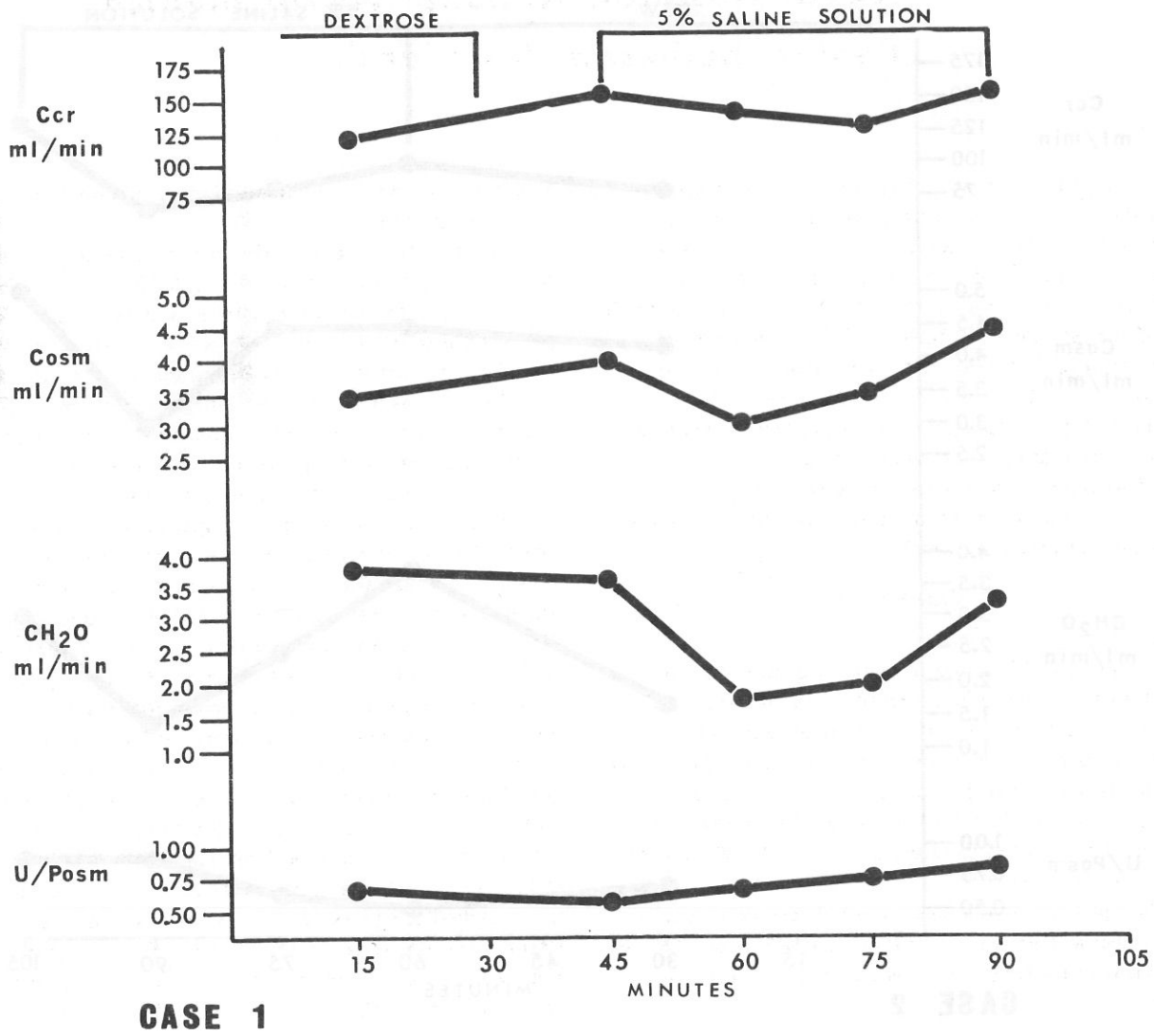
Approximately three weeks postoperatively, urine osmolality spontaneously reached 334 mOsm/kgH_2O with a corresponding serum osmolality of 289 (U/P Osm 1.2). Overnight, dehydration resulted in a urine osmolality of 370 mOsm/kgH_2O (U/P Osm 1.5).

Case 2.

A 48-year-old male test pilot was admitted to the Bethesda Naval Hospital with recurrent bleeding and pain from a duodenal ulcer. A below-knee amputation of the right leg had been performed as a consequence of traumatic vascular insufficiency. The remainder of the history was noncontributory and physical examination revealed the right below-knee amputation. Blood pressure was 130/75 mm Hg. On admission the following laboratory data were obtained: hematocrit, 47 ml/100 ml; white blood cell count, 6,000/cu mm with

Figure 1.

Response of patient (Case 1) to hypertonic saline solution infusion (0.125 cc/kg/min).



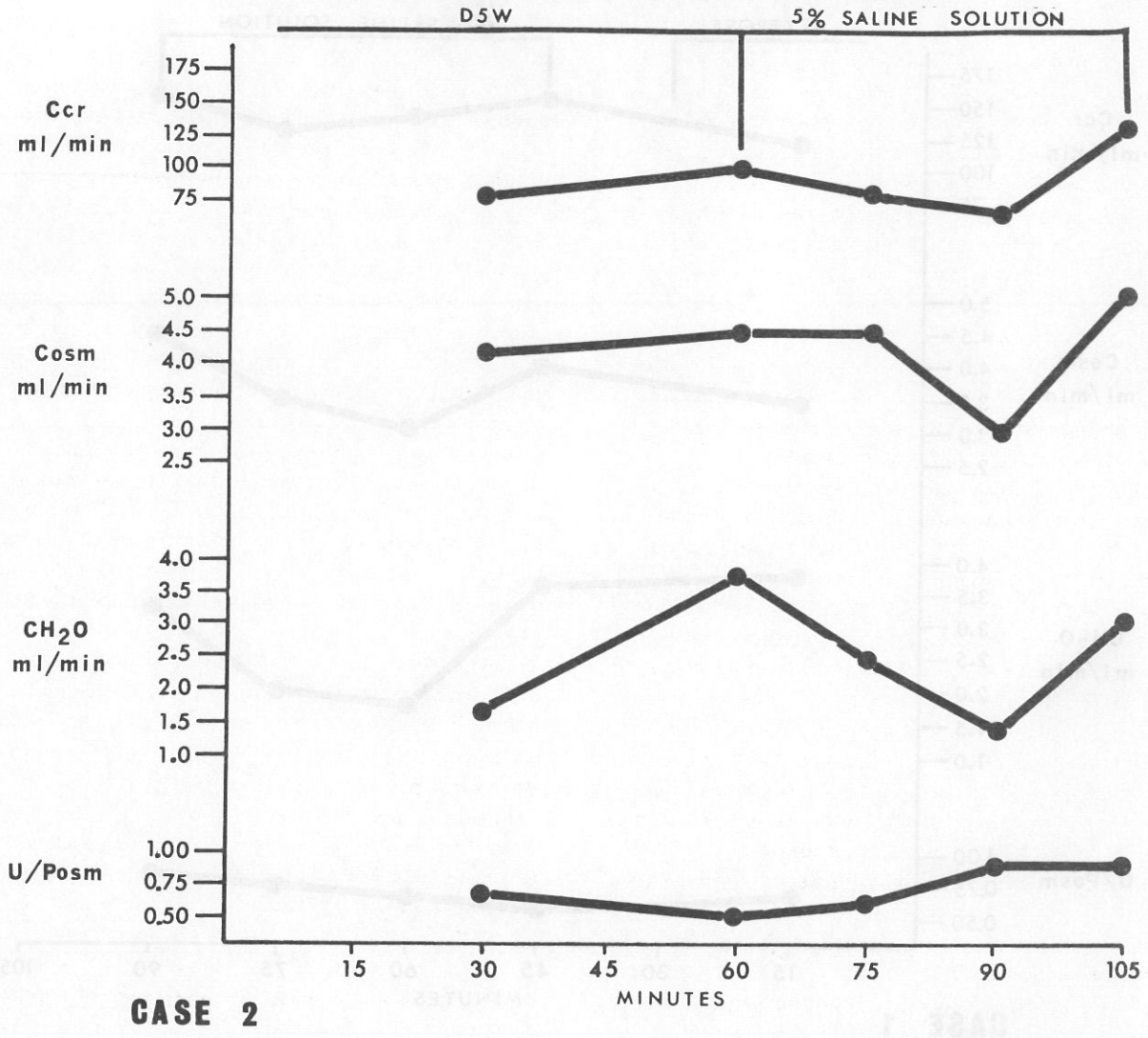
a normal differential; BUN, 15 mg/100 ml, and; serum electrolytes were within the normal range. Urinalysis: specific gravity 1.015 (random sample); pH 7 (repeat 5.0), and; 0-1 white blood cells/high-power field on microscopic examination.

Two days after admission, the patient underwent a pyloroplasty and a hemigastrectomy under Penthrane anesthesia for four hours. There was no premedication, and no hypotension was observed during the procedure.

One day postoperatively, the BUN was 30 mg/100 ml and the serum sodium was 149 mEq/L. The hematocrit was 45 ml/100 ml and the white blood cell count was 8,400/cu mm. Amylase was normal. Urine volume was 4.0 liters/24 hours (approximately 1 liter negative balance). This trend of diuresis continued and on the fourth hospital day the patient complained of dry mouth and had a negative fluid balance of 5 liters. BUN was 36 mg/100 ml; serum sodium was 150 mEq/L; urine specific gravity was consistently less than 1.010. The patient's response to infusion of hypertonic saline solution is graphically represented in Figure 2. After 12 hours of dehydration, the patient's urine osmolality reached only 235 mOsm/kgH_2O (U/P Osm = 0.77). The administration of Pitressin (aqueous, 10 units subcutaneously) failed to alter this ratio.

The patient continued to manifest azotemia and creatininemia, the latter reaching 2.9 mg/100 ml on the tenth day postoperatively. Urine volumes continued in the range of five to six liters per day and

Figure 2.
Response of patient (Case 2) to hypertonic saline solution infusion (0.125 cc/kg/min).



urine osmolalities failed to exceed plasma osmolality, despite up to four liters of net negative fluid balance and protein restriction. One month postoperatively, the patient's BUN was 20 mg/100 ml, serum creatinine was 1.1 mg/100 ml, and U/P Osm was 1. Pitressin administered after an overnight fast increased this ratio to 1.2. Two months postoperatively, the BUN was 18 mg/100 ml and serum creatinine was 1.0 mg/100 ml. Urine osmolality after 16 hours of dehydration was 560 mOsm/kgH_2O (U/P Osm 1.84).

Discussion

The clinical course of both patients followed the sequence of events reported elsewhere.[1-6] Both underwent an abdominal operation for a somewhat prolonged period (four to six hours) under methoxyflurane anesthesia. Hypotension did not occur during the procedure and mismatched blood was not used. Two to five days postoperatively, large volumes of dilute urine were excreted with a rise in both the blood urea nitrogen and serum sodium concentration. Although this development was transient in the case of the first patient, the second patient continued to manifest azotemia and creatininemia. In both patients the urine failed to concentrate under the stimuli of infusion of hypertonic saline solution and of exogenous aqueous Pitressin. Both a urine-to-plasma osmolality of less than one, as well as persistent positive free water clearances, were observed during these procedures. In both cases the syndrome was short-lived. The first patient responded to Pitressin within two weeks, attaining a urine-to-plasma osmolality of 1.5. The urine of the second patient concentrated only after one month following exposure to methoxyflurane.

Although Paddock and his co-workers[3] failed to find a causal relationship between methoxyflurane anesthesia and renal function deterioration, enough circumstantial evidence is present to implicate this agent, at least indirectly, as nephrotoxic. Numerous authors have commented on the occurrence of nephrogenic diabetes insipidus, with or without azotemia, after the use of methoxyflurane.[4-7] The incidence ranges from four[8] to 24[5] percent, depending on the series cited. Although mild to moderate impairment of function has occurred in most cases, there have been cases in which the disease has progressed to a full-blown uremic syndrome, and death.[7]

The mechanism involved is unclear. The only concrete finding in those cases where tissue is available is the deposition of oxalate crystals in the renal tubules and the medullary interstitium.[3,5,7,9] Since oxalic acid is a metabolite of methoxyflurane it is conceivable that this product is the offending agent as is seen in ethylene glycol nephropathy.

Many authors have been quick to point out that calcium oxalate crystals may be found in the kidneys of most patients with acute renal failure from a variety of causes.[2,10] Although perhaps not the major insult, crystalline deposition may play at least a secondary role.

More recently, Taves and his co-workers[11] noted elevated levels of both inorganic fluoride and nonvolatile organic fluoride in the blood of two patients with nephrotoxicity following methoxyflurane anesthesia. They postulated that these by-products of methoxyflurane metabolism may be responsible for the observed effects. These authors noted that both their patients were obese and suggested that a higher dose of the anesthetic is required for them because of the high fat solubility. Hence, a greater concentration of metabolites would be formed which may directly or indirectly affect the kidney. This sequence has not been studied extensively enough to draw any conclusions.

Still other researchers have suggested that a synergistic effect of methoxyflurane combined with another drug, specifically tetracycline, is responsible for the observed effect.[9] Only one of the patients reported here received potentially nephrotoxic antibiotics. He did not receive these medications in sufficient doses nor for a sufficient length of time to ascribe the renal dysfunction to these drugs alone, although a combined effect cannot be ruled out. However, many patients in other reported series who suffered polyuric renal failure following methoxyflurane have not received other drugs.[3,6,7]

No matter what the mechanism, it seems clear that the occurrence of nephrogenic diabetes insipidus with or without azotemia bears a temporal relationship to the use of methoxyflurane. It is difficult to ascertain the dose of the agent used in the cases reported and, no doubt, this factor is significant if an agent is to be called toxic.

Furthermore, there appears to be a spectrum of nephropathies associated with methoxyflurane ranging from a mild to moderate concentrating defect, with an apparent good prognosis, to a fulminant uremic state which may be fatal.[5,7]

Obviously a need exists for a controlled study to determine what factors influence the incidence and severity of the nephropathy that is associated with methoxyflurane.

Summary

The events surrounding the occurrence of nephrogenic diabetes insipidus following the use of methoxy-

flurane anesthesia were examined in two patients. Obesity, shock, and concomitant drugs were not consistent findings. Although a cause and effect relationship cannot be ascribed with certainty, circumstantial evidence implicates methoxyflurane as a potentially nephrotoxic agent. The pathogenesis of the renal injury has not been conclusively determined.

REFERENCES

1. Artusio J; Van Poznak A; Hunt RE, et al: A clinical evaluation of methoxyflurane in man. Anesthesiology 21: 512-517, 1960.

2. Crandall WB; Pappas S; Macdonald A: Nephrotoxicity associated with methoxyflurane anesthesia. Anesthesiology 27:519-607, 1966.

3. Paddock R; Packer J; Guadagni N: The effects of methoxyflurane on renal function. Anesthesiology 25:707-708, 1964.

4. Lebowitz M: Nephrogenic diabetes insipidus following methoxyflurane anesthesia. Anesth Analg 48:233-236, 1969.

5. Frascino J; Vanamee P; Rosen P: Renal oxalasis and azotemia after methoxyflurane anesthesia. N Engl J Med 283:676-679, 1970.

6. Elkington S; Goffinet J; Conn H: Renal and hepatic injury associated with methoxyflurane anesthesia. Ann Intern Med 69:1229-1236, 1968.

7. Panner R; Freeman R; Roth-Mayo LA; et al: Toxicity following methoxyflurane anesthesia. I. Clinical and pathological observations in two fatal cases. JAMA 214:86-90, 1970.

8. Pezzi P; Frobese AS; Greenberg SR: Methoxyflurane and renal toxicity. Lancet 1:823, 1966.

9. Kuzucu E: Methoxyflurane, tetracycline, and renal failure. JAMA 211:1162-1164, 1970.

10. Teschan P, Lawson N: Studies in acute renal failure: prevention by osmotic diuresis and observations on the effect of plasma and extracellular volume expansion. Nephron 3: 1-16, 1966.

11. Taves D; Fry BW; Freeman R; et al: Toxicity following methoxyflurane anesthesia. II. Fluoride concentrations in nephrotoxicity. JAMA 214:91-95, 1970.

NEW HEMATOLOGY LAB AT BETHESDA

With the snip of a ribbon, the Naval Hospital at the National Naval Medical Center in Bethesda, Md., officially opened its newly renovated Hematology Laboratory in early March 1972. The Lab was refurbished during the installation of central air conditioning equipment in the spaces. The new laboratory is better equipped to provide more efficient service for the patients at the hospital.

The hematology renovation is part of a complete renovation of the laboratory service at the hospital which is scheduled to be completed in early 1973. Since Jan 1970, when the lab was transferred from the Naval Medical School to the Naval Hospital at the Center, the 15 services in the lab have been gearing up to provide services to other military medical facilities in the area. Under the new regional concept of Naval medical facilities, smaller facilities such as Patuxent River, Quantico, and Annapolis will send most of their lab specimens to the Naval Medical Center.—PAO, NNMC, Bethesda, Md.

Cutting the ribbon is the head of the Hematology Lab, LCDR Gerald Penn, MC, USN, and assisting him is Miss Cheryl Roock, hematology supervisor. Also witnessing the official opening are (rear, left to right): RADM F.P. Ballenger, MC, USN, the Commanding Officer of the Medical Center; CAPT M.J. Valaske, MC, USN, chief of the laboratory service at the hospital; and CAPT Paul Kaufman, MC, USN, director of clinical services at the hospital. Already at work in the new lab are lab technicians, Geraldine Egan (left foreground), and HM1 Eugene Cager (right foreground).

Regional Health Care Delivery

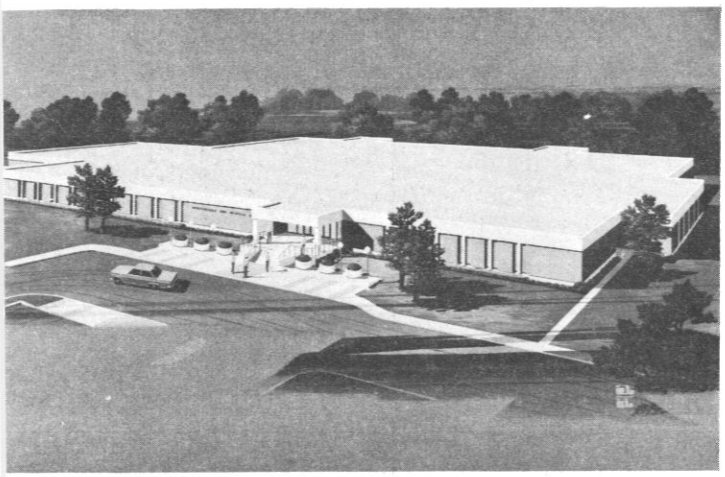
By Mr. D. M. Ginsburgh and LT Richard R. Apgar, MSC, USNR, Public Affairs Department, Naval Regional Medical Center, Portsmouth, Virginia.

Since July 1971, the Navy has been conducting a bold innovative pilot program of regional health care delivery in the Tidewater area of Virginia, designed to make management more effective and service more responsive. Two organizations — the Naval Regional Medical Center (NRMC) and the Naval Hospital, Portsmouth, Virginia — comprise the system. They provide a continuum of services ranging from first aid to the most sophisticated therapy for some quarter of a million eligible persons in the southeast corner of Virginia, the Tidewater area. Among the eligibles are active duty personnel and their dependents, retirees and their dependents, and Department of the Navy civilian employees.

A rear admiral in the Navy Medical Corps serves as Commanding Officer of the Naval Hospital and Director/Commanding Officer of the NRMC with overall management responsibilities for both. RADM Joseph L. Yon was the first to hold these positions and, upon his retirement on 31 March 1972, he was succeeded by RADM Willard P. Arentzen, MC, USN. Because of this dual role, various aspects of the two organizations are coordinated into an integrated health care delivery system. Resources management and support services have been centralized under the Admiral's authority and certain medical services have been reorganized along regional lines.

RADM Joseph L. Yon, MC, USN (Ret.), the first CO of the Naval Hospital Portsmouth and Director/CO of NMRC with overall management responsibility for both. RADM Yon retired on 31 Mar 1972 and was succeeded by RADM Willard P. Arentzen, MC, USN.

Naval Hospital Portsmouth, Va.

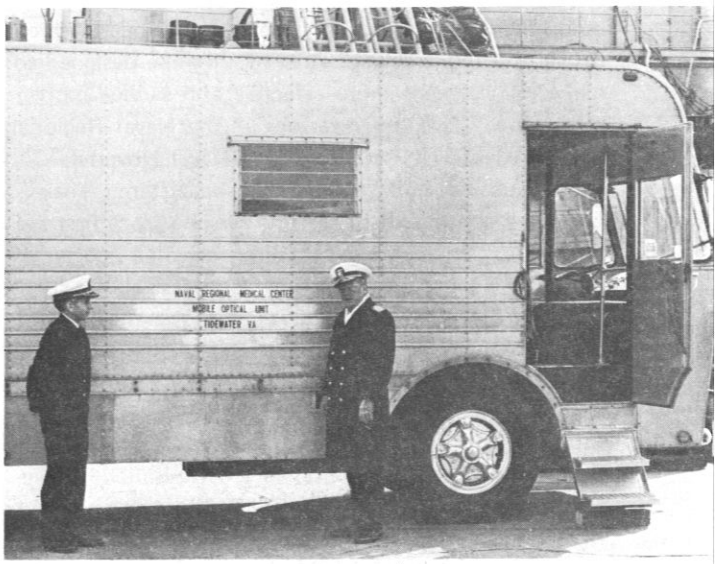


Architectural drawing of the newly-opened Admiral Joel T. Boone Clinic, Little Creek Amphibious Base, Norfolk, Va.

NRMC Branch Dispensary, Naval Air Station, Norfolk — one of nine dispensary-level medical facilities included in regionalization.

NRMC Branch Dispensary, Naval Station, Norfolk, Va.

NRMC Medical Facility, Naval Weapons Station, St. Juliens Creek, Portsmouth, Va.



RADM J.L. Yon, MC, USN, now retired (right), and CAPT W.P. Arentzen, MC, USN (now RADM and successor to RADM Yon), left, stand before the NRMC mobile optical van dedicated in Feb 1972. The van contains a screening room and 20-foot eye lane, with Titmus vision tester for screening, eye chair and stand, phoropter, projector and screen, lensometer and hand instruments. The van can be stationed near a ship to accommodate personnel requiring eye examinations, and can be used for dependents at more remote dispensaries without an assigned optometrist. The van will be manned by a hospital corpsman and NRMC optometrists (on a rotating basis).

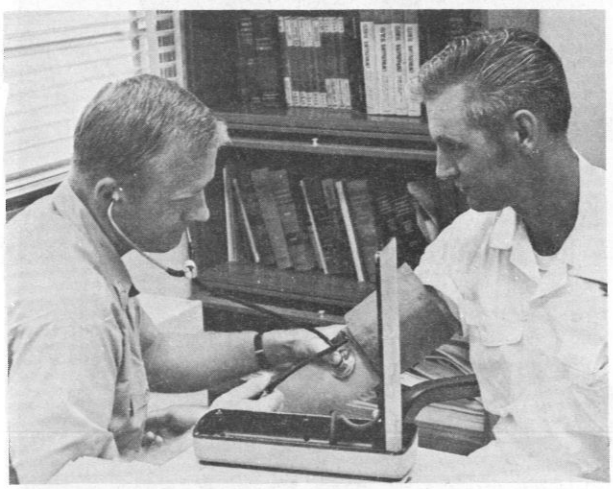
Key elements in the Navy's new regional approach to health care delivery have been the consolidation of several outpatient medical facilities within a geographic area into a single command (the NRMC) under a medically-oriented Regional Director — the first time in Navy history this has been done — and integration of this command's operations with those of the Naval Hospital.

Prior to establishment of the regional approach, the 15 Navy medical facilities in the Tidewater area were managed by nine different major commands. Each dispensary-level facility supported the operating mission of, and in turn received support from, the major activity of which it was an integral part, e.g. a Naval Air Station, a Naval Supply Center. Although a District Medical Officer had coordinating responsibilities, his actual authority was limited. Diffuse management created two basic problems. For the patient, the approach to total health care failed to provide maximum responsiveness. In terms of management, there was duplication as well as inefficient use of scarce health care resources — men, money, material and facilities. No area-wide effort could be mounted to overcome these difficulties because of multiple command structures with multiple sources of funds and management authority.

Consolidated management, whereby a single authority whose sole concern is health-care delivery administers all aspects of such delivery in a geographic area, provides a formal mechanism for such things as area-wide patient management, determination of priorities, efficient use of resources and introduction of new and/or improved services. Although the following discussion of the Tidewater Naval Health Care Delivery System will treat the NRMC and the Naval Hospital as separate entities, the integration of their operations will be obvious throughout.

The Naval Regional Medical Center consists of nine branch dispensaries and six medical representatives (small medical facilities manned by no more than three persons, usually hospital corpsmen), in addition to the administrative and support staffs. Branch dispensaries are located at the following activities: Naval Air Station, Norfolk; Naval Station, Norfolk; Naval Air Station, Oceana; Armed Forces Staff College; Naval Amphibious Base, Little Creek; Naval Weapons Station, Yorktown; Fleet Anti-Air Warfare Training Center, Dam Neck; Norfolk Naval Shipyard; and Naval Supply Center. A new facility, the Admiral Joel T. Boone Clinic at Little Creek, began operations during late March. Medical representatives are located at the following sites: Naval Radio Station, Northwest; Naval Radio Station, Driver; Craney Island Fuel Center; Naval Weapons Station Annex, St. Juliens Creek; Naval Air Landing Facility, Fentress; and Naval Supply Center Annex, Cheatham, Williamsburg.

Each dispensary-level facility is headed by a Senior Medical Officer who coordinates its internal professional operations. He reports directly to the Assistant



All NRMC branch dispensaries and medical representatives provide basic medical service.

Hospital Corpsmen are of vital importance in NRMC health-care delivery.

Regional Director for Health Care Delivery who is also the NRMC's Deputy Director. Services provided by each dispensary/medical representative depend upon size, assigned personnel and people served. Dependent-oriented dispensaries, for example, provide obstetric-gynecology and pediatric care, while those at the Naval Air Stations devote some time to aviation medicine and physiology. All, of course, provide basic general medical care.

One of the more significant changes produced by regionalization involves realignment of responsibilities in outpatient health care delivery. Two dispensaries, the one at the Naval Air Station in Norfolk, and the one formerly used by all patients at Little Creek, have been designated primarily for outpatient treatment of active duty personnel. The branch dispensary at Naval Station, Norfolk, and the new Admiral Joel T. Boone Clinic at Little Creek, are general/specialized outpatient facilities for retirees and dependents. They also serve active duty personnel in specialty clinics. All four continue to serve civil service personnel assigned to the host commands. Such designations eliminate the often frustrating competition that had existed for doctors' time, as well as space, within a facility. Active duty personnel are seen and returned to duty more rapidly under this arrangement.

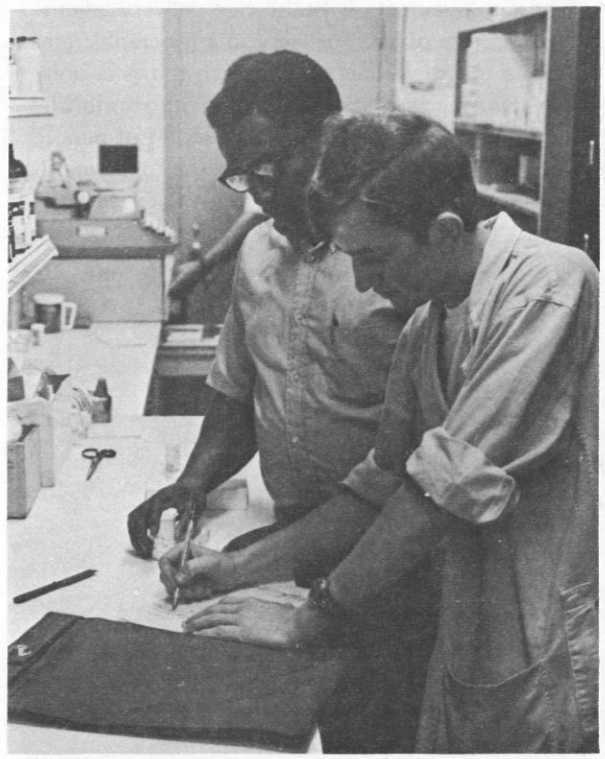
A second major change is the expansion in available specialty services at Norfolk Naval Station and Little Creek through part-time clinics staffed by teams from the Naval Hospital. These teams, which include doctors and paramedical personnel, provide services which previously were available only at the Hospital. When appropriate, support personnel such as technicians accompany the teams from the Hospital. The visiting team concept is in keeping with the rapidly emerging philosophy in health care delivery, that of taking the service to the patients. It saves travel time and bridge/tunnel tolls for most of them.

In addition to providing more responsive service for the patient, this innovation allows more efficient utilization of facilities. When the visiting teams are away from the hospital, others employ the same space. Two or more teams use the same space at a dispensary by avoiding conflicting schedules, and the dispensary uses this area for in-house purposes when no visit is scheduled. Because the number of patients that a doctor can see during a given time period is often determined as much by the availability of examining rooms as by time spent with an individual, patients are seen faster and waiting rooms are less crowded.

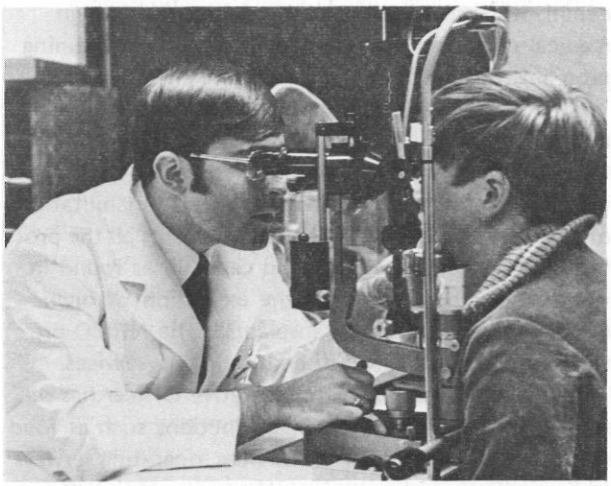
In addition to the branch dispensaries, the Assistant Regional Director for Health Care Delivery has direct responsibility for those services which have been regionalized. These include laboratory, pharmacy, ophthalmology, radiology, optical fabricating and preventive medicine, each of which has its own Chief of Service. It should be noted that the NRMC provides these services to the Hospital. There is also a Regional Nursing Advisor.

The Regional Pharmacy Service provides an excellent example of improvements which can be effected through centralized management. The pharmacy at each branch dispensary stocks between 200 and 600 drug line items. If a person requested an unstocked item prior to regionalization, he could wait until it was ordered and delivered from a supply house, purchase it from a civilian source, or make the trip to the Naval Hospital pharmacy. Now, each branch pharmacy has ready access to 2,600 items stocked by the Hospital. Twice-a-day messenger runs insure that medicine ordered at a branch dispensary in the morning can normally be picked up there in the afternoon. Also, centrally-compounded prepackaged pharmaceuticals from the Hospital are made available and relieve branch pharmacy personnel of time-consuming work. This saving is passed on to the patient.

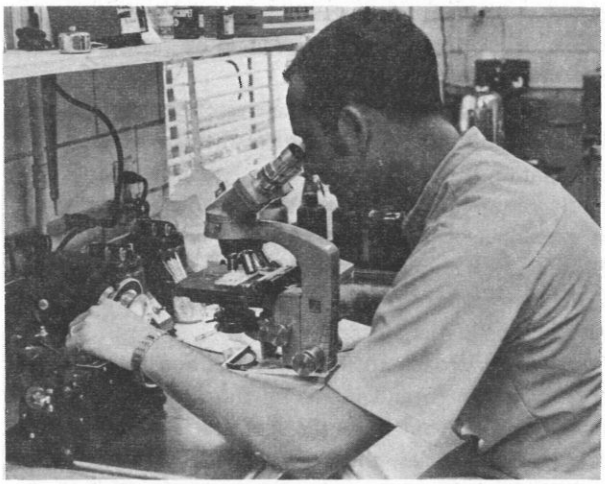
Regionalization of the ophthalmology service has particularly benefitted users of the Yorktown Branch



Twice-a-day messenger runs take pharmacy service to the patients.



Ophthalmology-optometry service has been regionalized under the NRMC.



Laboratory Service has also been regionalized.

Dispensary at the Naval Weapons Station. An optometrist, normally assigned to the Norfolk Naval Air Station facility, operates an eye lane once each week at Yorktown. Previously, eligible personnel from the Yorktown area who required eye refraction service from a Navy medical facility had to make a 100-mile round trip to Portsmouth. Travel time amounted to about one and one-half hours each way, and expenses included $1.80 for bridge tolls in addition to gasoline money.

As mentioned earlier, a fundamental concept of the new approach dictates that all resources and support associated with health-care delivery should be under the control of the Regional Medical Director. Other forms of support, which have not been already discussed, are administered through either the Assistant Director for Resources Management or the Assistant Director for Support Services. This centralization, quite obviously, eliminates redundant functions.

The Assistant Director for Resources Management is responsible for efficient utilization of all NRMC and Naval Hospital medical resources except for those which are unique to the hospital. He develops system-wide requirements and coordinates operation of regional medical manpower management through centralized military and civilian personnel departments, a financial and material management department, and a data processing department. He is also responsible for initial planning and design of all the physical facility requirements.

One of the prime benefits to be reaped from regionalization involves a highly flexible system of manpower management in which the central authority mobilizes manpower to meet peak work loads and/or special requirements. If, for example, one NRMC branch dispensary knows from appointment records or prior experience that it will experience a heavy work load, while another can predict a lighter-than-usual schedule, personnel can be temporarily shifted accordingly. Similar personnel shifts provide coverage for smaller facilities during leave periods.

Area-wide financial management through the NRMC has proved highly beneficial. Under the previous organizational arrangement, a dispensary's needs competed with such items as barracks and roadways for a share in the command's budget. Admiral Yon has pointed

Bettye P. Byrd (left) was awarded the Navy Superior Civilian Service Award for consistently outstanding accomplishments as Director of Civilian Personnel for the NRMC and the Naval Hospital Portsmouth. She is congratulated by RADM J.L. Yon, MC, USN, former Director/Commanding Officer of the NRMC and Naval Hospital. Mrs. Byrd has been accorded the highest honor rendered to a civilian employee by BUMED.

out that, "Now they compete only with other medical needs, and priorities are determined by people knowledgeable in medical services."

Another dividend of regional resources management is the establishment of a central medical storeroom, eliminating duplicate inventories and paperwork formerly required of twelve separate medical storerooms. A personnel office at the Norfolk Naval Station Branch Dispensary has been eliminated, and personnel who had been assigned to these operations have now been returned to patient care.

A new approach to in-service training for hospital corpsmen (up to and including third class) has been introduced. From both the Hospital and the NRMC branch dispensaries, these men attend a three-day session during each six-month period. Under the old system, they attended only two one-hour classes each week at their own dispensary or at the hospital. This new arrangement allows for better planning and presentation without constant interruption of routine schedules.

The Assistant Director for Support Services administers the NRMC's nonprofessional support functions and provides most of these services for the Naval Hospital. Under his jurisdiction are the operating services, the public affairs program, outpatient administrative services, disbursing services, security services, public works advice and systems' design development. As part of its support services, the NRMC has established an informative area-wide public affairs program devoted solely to providing information about Navy medical services and facilities. Messenger service has been initiated between the Hospital and the larger NRMC branch dispensaries to facilitate rapid delivery of such things as laboratory reports. All NRMC dispensaries have been converted to centralized contract linen service at considerable savings. These are just a few examples of what has been accomplished in the area of support services through regionalization.

The Portsmouth Naval Hospital continues in its traditional role of providing general clinical and hospitalization services for active duty personnel and their dependents, retirees and their dependents, and other eligible personnel. Although it functions primarily as a regional hospital for the Tidewater area, it provides specialized treatment for the Navy as a whole in thoracic and cardiovascular surgery, neurosurgery, plastic surgery, oncology and in a radioisotope laboratory. The Navy's oldest and second largest hospital, it conducts residency and internship training programs for U.S. Navy medical and dental officers, as well as observerships for foreign medical personnel. It also provides extensive training programs for enlisted medical personnel.

The Executive Officer of the Naval Hospital Portsmouth, as director of professional services, assists the Commanding Officer in coordinating professional functions, programs, and policies concerning rehabilitation of patients. Presently the Hospital contains all the professional medical specialties and capabilities found in most general hospitals with the exception of open heart surgery and organ transplants. The NRMC provides laboratory, pharmacy and radiology services.

The Naval Hospital's Administrative Officer has responsibility for nonprofessional functions such as food service, public works, special services, operating services (that portion which pertains only to the Hospital), patient affairs and security. Although other nonprofessional services such as data processing, disbursing, fiscal and supply, civilian personnel and military personnel are provided through the NRMC, the Administrative Officer must work closely with these services and his NRMC counterparts to insure that the Hospital's needs are adequately met.

Regionalization has scarcely altered the services or day-to-day operations of the Hospital, but certain benefits have accrued. For example, better rapport has been fostered between hospital doctors, particularly specialists, and those at the dispensaries. To further enhance this accord, an innovation has been introduced whereby dispensary doctors spend time at the hospital working in a specialty of their choice. This not only provides a welcome change of pace from what may become a boring, repetitive dispensary routine, but also creates a fine opportunity to become better acquainted with specialists who share referred patients and perform definitive surgery. Enhanced continuity of patient care also results when the visiting specialty teams from the Hospital travel to the dispensaries to conduct part-time clinics. The same doctor who examined the patient at the branch dispensary will provide follow-up treatment at the Hospital should this be necessary.

The Navy's regional approach to health-care delivery, as embodied in the Tidewater area's pilot program, does not provide instant solutions to all modern health-care delivery problems. It does, however, represent a step in the right direction and has opened the door to countless benefits heretofore untapped. It also marks the Navy as a leader in the universal search for better ways to serve each and every patient.

ON THE REPRODUCIBILITY OF PERIODONTAL INDICES

By CAPT J. Roy Elliott, DC, USN; Director Oral Physiotherapy Center, U.S. Naval Academy, Annapolis, Md.; and Bennie A. Clemmer,** M.S., Ph.D., U.S. Public Health Service*

The common denominator in the etiology and progression of both dental caries and periodontal disease is dentobacterial plaque. Indices have been developed to score both the presence of dental plaque and the status of periodontal disease. Most scoring systems, however, were developed for epidemiological studies and do not reflect a critical evaluation of the status of oral cleanliness or periodontal health.

The need for a more sensitive scoring system arose while conducting preventive periodontal studies at the U.S. Naval Academy. For those studies[1,2] bacterial plaque and periodontal disease indices were developed in an attempt to reflect more accurately small changes in the dental plaque condition and in the gingival tissues. These indices are modifications of the Navy Plaque Index and Navy Periodontal Disease Index.

It becomes of interest to assess the reproducibility of these indices by different examiners and also by the same examiner on successive occasions. Two studies were conducted at different times using the same design but different examiners and subjects. The results of the two studies were so nearly parallel that only one study will be presented for the sake of brevity.

Methods

Twenty-five midshipmen with a gingivitis were chosen as subjects for this study. Two dental officers, designated Examiner A and Examiner B, were selected to conduct the examinations. The examiners were instructed in the use of the indices until they were adequately calibrated.

Subjects were scheduled for two examination periods exactly one week apart. During the first examination period the subjects were divided whereby examiners A and B would do an equal number of initial examinations and then switch patients. The sequence of examinations was reversed the following week. Thus each subject was examined by both

*D.D.S., M.S. Presently Head, Periodontics Dept., U.S. Naval Hospital, Yokuska, Japan.

**Statistician, National Institute of Dental Research, U.S. Public Health Service, Bethesda, Md.

The opinions or assertions contained herein are those of the authors and are not to be construed as official or reflecting the views of the Department of the Navy or the naval service at large.

Figure 1. Scores are determined for the mesial and distal of facial and lingual surfaces of teeth numbers 3, 9, 12, 19, 25 and 28.

GINGIVAE & GINGIVAL DEPTH INDEX

GINGIVAL SCORE

Score 0 **Gingival tissue normal color and tightly adapted to the teeth. Tissue has firm consistency and normal architecture is present.**

Score 1 **Any detectable inflammatory changes and may include:**
- **a. Any color change from normal.**
- **b. Loss of normal density and consistency.**
- **c. Slight enlargement of the papilla.**
- **d. Tendency to bleed upon palpation.**

Score 2 **When the above changes extend to the marginal gingiva and are more pronounced exhibiting moderately or acutely inflamed gingival tissue.**

POCKET SCORE

Score 0 **When the probe reveals pocket depth not exceeding 2 mm.**

Score 1 **The pocket depth exceeds 2 mm but less than 3 mm.**

Score 2 **The pocket depth exceeds 3 mm but less than 4 mm.**

Score 3 **The pocket depth is beyond 4 mm.**

doctors on each of two dates. The subject was first examined according to the Gingivae-Gingival Depth Index (Figure 1) followed by an assessment of plaque utilizing the Navy Plaque Index (Modified) (Figure 2). Fox periodontal probes were calibrated for accuracy and color-coded to simplify measuring the gingival pocket depth. For staining the dental plaque six drops of 6% alcoholic basic fuchsin solution in 15 cc tap water was used. The subjects rinsed with the disclosing solution for 15 seconds followed by two rinses with cold tap water.

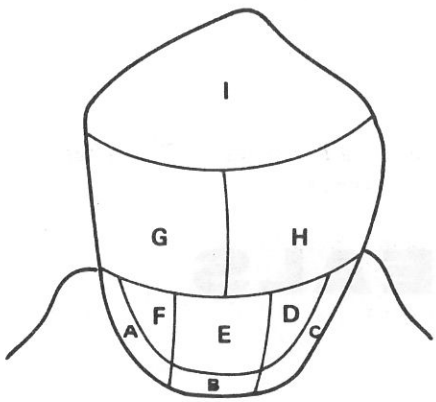
Results

In such a paired study the quantity of interest is some measure of agreement of each examiner with himself and with other examiners. On each call the examiner either agrees with himself, or the other examiner, or he disagrees. By taking successive differences between the two calls made by one examiner at two times or by two examiners, we can identify the units on which the calls were identical. This number divided by the total number of units gives the proportion agreement in scores. (See Table 1.) If the examiners were merely assigning scores at random, they would agree by chance one-third, one-fourth, and one-tenth of the time on gingivae, gingival depth, and plaque scores respectively. In every case the agreement was significantly better than chance ($p \leqq .01$), thus indicating a definite tendency to score alike. It should be observed that within examiner agreement was higher than between examiner agreement.

Discussion

The assignment of numbers to assess the extent of dental plaque formation and the status of gingival health is based on subjective determinations which account for some degree of within- and between-examiner disagreement. In addition, the gingival status may change from normal to inflamed, or the reverse,

Navy Plaque Index (Modified)



AREA A, B, C SCORE 1 A thin line of stained plaque of approximately 1 mm or less adjacent to the gingival tissue, both facial and lingual.

AREA D, E, F SCORE 1 The stained plaque extends further into the gingival zone.

AREA G & H SCORE 1 The mesial and distal halves of the middle zone area, both facial and lingual.

AREA I SCORE 1 The occlusal zone.

Score facial and lingual areas. The total score for each tooth is the sum total of all areas of stained plaque on that tooth.

Figure 2. The assessment of stained plaque is taken on the facial and lingual surfaces of teeth numbers 3, 9, 12, 19, 25 and 28.

Table 1

PROPORTION AGREEMENT IN SCORES

	Gingivae	*Gingival Depth*	*Plaque*
Between Examiners	**.64 ± .02***	**.69 ± .02**	**.44 ± .02**
Within Examiner A	**.81 ± .02**	**.74 ± .02**	**.46 ± .02**
Within Examiner B	**.76 ± .02**	**.78 ± .02**	**.49 ± .02**

*Sample proportion (number of scoring units – surface-half for gingivae and gingival depth, surface for plaque – divided by total number of units) ± standard error of proportion.

between consecutive examinations. One study reported a reversal rate ranging from 14-25% between two consecutive examinations.[3] It has been pointed out that the more sensitive an index becomes, the greater the problem of inter- and intra-examiner reproducibility.[4] Inasmuch as these variables may influence the assignment of scores, the agreement achieved in this study was considered to be quite good.

Summary

Twenty-five subjects and two examiners participated in a study to assess the reproducibility of certain periodontal indices. Each subject was examined by both doctors on each of two occasions thus allowing between- and within-examiner agreement to be assessed. In every case strong agreement was indicated. Within-examiner agreement was higher than between-examiner agreement. These indices were judged to be suitable for use in continuing periodontal studies at the U.S. Naval Academy.

REFERENCES

1. Elliott, J.R.; Bowers, G.M.; Clemmer, B.A.; and Rovelstad, G.H.: A Comparison of Selected Oral Hygiene Devices in Dental Plaque Removal. J Periodontol. Publication pending.

2. Elliott, J.R.; Bowers, G.M.; Clemmer, B.A.; and Rovelstad, G.H.: Evaluation of an Oral Physiotherapy Center in the Reduction of Bacterial Plaque and Periodontal Disease. J Periodontol. Publication Pending.

3. Suome, J.D.; Smith, L.W.; and McClendon, B.J.: Marginal Gingivitis During a Sixteen Week Period. J Periodontal 42: 268 May 1971.

4. Greene, J.C.: The Design of Clinical Studies of Oral Hygiene. Ann NY Acad Sci 153:320, Art. 1.

MISSED MEALS

By LCDR Paul E. Petit, MC, USN,*
ENS Warren T. Wilson, USNR, and
ENS Theodore N. Georges, USNR;
Naval Safety Center, Naval Air Station,
Norfolk, Virginia.

In the aeromedical community, one is often confronted with the importance of "missed meals" and the subsequent effect on pilot performance. The trend has been to incriminate missed meals in a consideration of accident causation. For example, during calendar years 1969-1970, the aircraft accident investigation board stated in 48 accidents that missed meals had occurred, but did not necessarily constitute a contributing factor. In an additional 13 accidents, four of which were fatal, the Aircraft Accident Report (AAR) stated that missed meals played a suspected causative role in eleven instances and a definite role in two. While the assessment of a definite role in these two cases was somewhat presumptive, the reader can easily grasp the importance placed upon missed meals. As a result, a review of the literature was conducted to determine the justification for current concern.

Most research in this area is relevant to long-term starvation of obese patients in contrast to ultrashort-term starvation, lasting 24-48 hours, which would be more applicable to the aviator. Despite this obvious difference, some useful information was derived from reports of stereotyped long-term experiments. It has been shown many times in experimental studies that a 40-day fast is well within the capability of a healthy adult and some obese individuals have completely deprived themselves of food for as long as eight months without ill effects. Ingested food provides energy for the various chemical reactions responsible for growth, maintenance of vital functions and physical activity. The dietary (exogenous) fuel sources of energy are carbohydrates, proteins, and fats which have an energy content yielding respectively four, four, and nine calories per gram on oxidation (combustion). The chief carbohydrate present in the blood and the usual principal fuel of the brain is glucose which is as crucial as oxygen. Rapid drops in the blood sugar (glucose) level can result in "fuel starvation" and terminate in injury/death. During starvation, the fuel source becomes endogenous, that is, body tissue breakdown and glucose synthesis via the liver and kidney cortex supply the needed energy. Within hours after initiating a "fast," there is a rise in blood amino acids and hyperuricemia appears, indicating protein breakdown. Concomitantly, there is an observed metabolic acidosis with increased blood free fatty acids, ketone bodies,

*Aviation Human Factors Analyst, Naval Safety Center, Naval Air Station, Norfolk, Va. 23511.

The opinions or conclusions contained in this paper are those of the authors and do not necessarily reflect the views or endorsement of the Navy Department or the naval service at large.

and ketonuria; the excretion of sodium, potassium and urea nitrogen in the urine is increased. Such observations remain unchanged throughout the 40-day fast investigations and these results are similar to those seen in the early stressful stages of surgical convalescence described by Moore and others. On the average, each patient lost approximately 0.8 pound per day and no serious metabolic disturbances were encountered when the fast lasted less than 40 days. When the usual physical activity was maintained, the blood glucose sometimes gradually declined after two days of fasting, reaching a minimum at about five days, as low as 40-50 mg/100 ml on occasion. As the fast continued, the blood sugar characteristically returned to normal during the second week.[1] Even when this "drop" occurred, symptoms of hypoglycemia were not observed. Some investigators speculate that this is attributable to brain adaptation to an additional energy substrate, collectively called ketone bodies, which begins as early as the first week of starvation.[2] When fasting was prolonged for more than 40 days, many disturbances were observed at various intervals; among these were electrolyte disorders, protein deficiency, normochromic anemia, and malabsorption of vitamin B_{12}.[3]

During the first few days of a starvation, healthy individuals experience an intense appetite and hunger sensation which almost disappears by the fourth day. The hunger sensation parallels the degree of gastric tonus, that is, as gastric tonus increases, the hunger sensation becomes more intense. The severity of these stomach contractions causes discomfort but does not interfere with light work. Other associated symptoms are a feeling of emptiness, weakness, mild headache and occasional nausea, all of which suggest a possible relation between hunger contractions and central nervous system hyperexcitability. The knee jerk is markedly exaggerated being greatest at the height of a gastric contraction, and diminishing to normal as hunger diminishes, that is, with gastric relaxation. Ironically, on the fourth day, most subjects develop a repugnance or indifference to food. Indeed, the most distressing period of starvation occurs during the first four or five days.[4]

More to the point is a study conducted by J.F. Meyer, an Air Force flight surgeon. In his study, Meyer measured the blood glucose levels of 15 normal male subjects before, during, and after high performance aircraft flight. Prior to flight, the subjects fasted for approximately twelve hours. Seven of the men rode in a jet fighter for a period of two hours and the remaining eight men rode in a transport aircraft for six hours. At no time was there a hypoglycemic state as determined by blood glucose levels and asymptomatology. Furthermore, in the fighter group, a marked increase in blood glucose occurred just prior to takeoff and gradually decreased thereafter to remain within physiologic normal limits.

At this point, functional hypoglycemia (reactive hypoglycemia) must be mentioned for it is a condition in which excessive insulin responds to an elevated blood glucose level following a meal or periods of excitement. This represents a physiologic disorder, that is, an abnormal metabolic response. A typical example of reactive hypoglycemia encountered in aviation is the pilot who eats a candy bar following a short starvation, and within an hour experiences hypoglycemic symptoms. This paper, however, is not primarily concerned with the aviator reactive hypoglycemic episode; it is primarily concerned with the effects of missed meals on normal people.

Studies pertaining to carbohydrate metabolism-respiratory physiology are few and the evidence indicates no adverse effects from fasting for 16 hours. In an experiment involving five healthy young men, there was an observed increase in the oxygen tension of arterial blood when the respiratory gas exchange ratio approached a value of one. Consequently, there is no apparent justification for incriminating missed meals in instances of susceptibility to hypoxia.[5]

To conclude then, missed meals spanning 24 hours would not seem to constitute sufficient stress to adversely affect the body physiology and it is improbable that a significant metabolic disturbance would result. Stomach contraction-hunger sensation appears to exert a most unpleasant effect and could conceivably cause distraction, breakdown in habit pattern, shortened attention span, and other psychological trait changes. Much research in psychomotor function or so-called pilot performance is needed to substantiate these psychological speculations. While research continues in this area, prudence would seem to dictate that missed meals should be viewed as unsafe.

REFERENCES

1. Cantarow A, Schepartz B: Biochemistry. Philadelphia, WB Saunders Co, 444, 1962.

2. Waterhouse C, Keilson J: Cori cycle activity in man. J Clin Invest 48:2359-66, Dec 1969.

3. Lawlor T, Wells DG: Metabolic hazards of fasting. Am J Clin Nutr 22:1142-9, Aug 1969.

4. Mountcastle VB: Medical Physiology. Vol 1, St Louis, CV Mosby Co, 420-1, 1968.

5. Saltzman HA, Salzano JV: Effects of carbohydrate metabolism upon respiratory gas exchange in normal men. J Appl Physiol 30:228-31, Feb 1971.

6. Birkenhager JC, Haak A, Ackers JG: Changes in body

composition during treatment of obesity by intermittent starvation. Metabolism 17:391-9, May 1968.

7. Brodan V, Kuhn E, Rath R, et al: Influence of acute fastings and refeeding on glucose utilization in healthy women. Nutritional Diets 10: 108-22, 1968.

8. Cahill GF: Starvation in man. N Engl J Med 282:668-75, (19 Mar) 1970.

9. Felig P, Marless E, Owen OE, et al: Blood glucose and gluconeogenesis in fasting man. Arch Intern Med 123:293-8, March 1969.

10. Holden EM: Fragmentation of cardiac myofibrils after therapeutic starvation. Lancet 2:55, (5 Jul) 1969.

11. Katz AI, Hollingsworth DR, Epstein FH: Influence of carbohydrate and protein on sodium excretion during fasting and refeeding. J Lab Clin Med 72:93-104, Jul 1968.

12. Meyer JF: Blood Glucose during high performance aircraft flight. Aerosp Med 40:310-15, Mar 1969.

13. Moore FD: Metabolic Care of the Surgical Patient. Philadelphia, WB Saunders Co, 25-133, 1959.

14. Veverbrants E, Arky RA: Effects of fasting and refeeding. J Clin Endocrinol 29:55-62, Jan 1969.

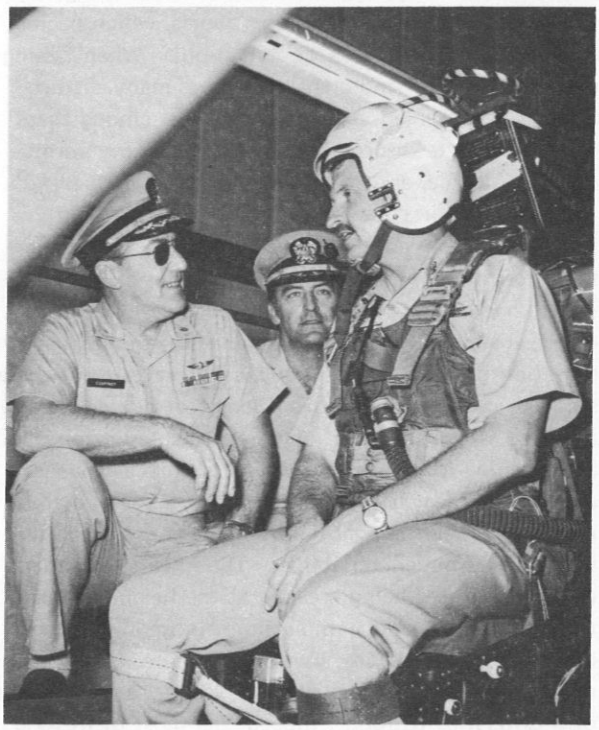
EJECTION SEAT TRAINER

The first course of instruction on the operation and maintenance of the Naval Aerospace Medical Institute's new 9E6 Universal Ejection Seat Trainer has been completed. It was conducted by L.R. Whisman, project engineer for the manufacturer, Burtek, Inc. Ten men from the Naval Training Device Center, Orlando, Fla., the Institute, and NAS Pensacola were the first to be instructed. The trainer incorporates a pneumatic catapult rather than the conventional ballistic catapult. The device is designed to accommodate all ejection seats currently found in Naval aircraft. The function of the device is to enable aircrew personnel to practice pre-ejection procedures and to instill confidence in ejection systems by simulating events occurring during an actual ejection.

The new device is installed in a new structure situated inside the walled area adjacent to the Institute. A nearby Butler building is being renovated to house a new altitude chamber which will provide facilities for advanced instruction in the use of oxygen and other life-saving equipment used in physiological training of flight crews.

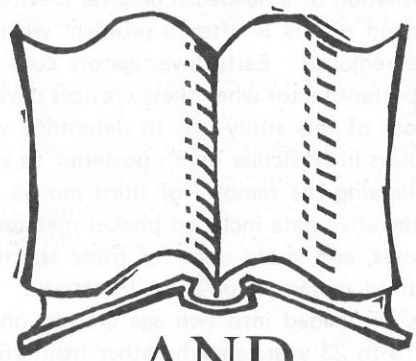
The Physiological Training Division of the Institute is headed by CDR Morris J. Damato, MSC, USN, veteran aerospace physiologist. He and CAPT Marvin D. Courtney, MC, USN, Institute Commanding Officer, were present when the first man used the new ejection trainer on 28 Jan. LCDR D.L. Rhodes, MSC, USN, Project Coordination Officer from Orlando, voluntarily took the first "training shot" on the device.

Course attendees were O.J. Devalcourt, P.J. Fleming, and Chief J.E. Burke of Orlando; D. Lambert of NAS Pensacola, and ENS R.S. Joyner, TDC L.F. George, TD1 G.I. Jefferson, TD1 R.L. Rothen, HM3 J.E. Hosford, and TDAN J.C. Zimmer.—PAO, Naval Aerospace Medical Center, Pensacola, Fla.



CAPT Marvin D. Courtney, NAMI CO, and CDR Morris J. Damato, MSC, USN, head of Aerospace Physiology Training at NAMI, were on hand when LCDR D.L. Rhodes, MSC, USN, Project Coordination Officer from Orlando, Fla., voluntarily took the first "training shot" on the new 9E6 Universal Ejection Seat Trainer at the Naval Aerospace Medical Institute.

ABSTRACTS AND REVIEWS



Histology of the Human Eye, by Michael J. Hogan, M.D.; Jorge A. Alvarado, A.B.; and Joan E. Weddell. 1st ed., 687 pp, 503 illus., $34.00, Philadelphia, W.B. Saunders Co., 1971.

Dr. Hogan has again demonstrated capacity for superb organization, thoroughness, and attention to detail in this new reference text. Ophthalmologists are well acquainted with his and Dr. Zimmerman's fine reference text, *Ophthalmic Pathology. Histology of the Human Eye* is certainly an indispensable companion text on normal ocular tissue and in many ways even exceeds the quality of the pathology text. It will remain the standard for a long time.

The preliminary chapters on cellular anatomy very clearly outline available knowledge on ultra-structure and relations to cellular biochemistry and physiology. The chapter on topographic anatomy provides a concise description of gross structures and their relationships to one another.

The remainder of the book is divided into conventional chapter headings for each tissue with an excellent discussion in each chapter integrating physiology, biochemistry, embryology, gross and microscopic anatomy. If the text should prove incomplete for the most academic of clinical ophthalmologists, numerous pertinent and contemporary references are available at the end of each chapter.

Finally, the compilation of conventional and scanning electron photomicrographs, excellent drawings and illustrative photography is superb and complements the very readable text. This reference work should be an indispensable addition to every ophthalmologist's library and certainly to every hospital library where an ophthalmologist is assigned or undergoing residency training.

LCDR R.T. McKinlay, MC, USN
Naval Hospital, NNMC, Bethesda, Md.

Immunology, by Joseph A. Bellanti, M.D., 1st ed., 584 pp, $15.75, Philadelphia, W.B. Saunders Co., 1971.

This is the first edition of a textbook the purpose of which is to "present the new immunology with its innumerable clinical implications." As such, it presents such topics as "man's pollution of his external environment, altered states of nutrition, the genesis and prevention of malignancy, the inflammatory diseases of connective tissue, and the basic functions of defense against invasion by infectious agents."

The text is organized in three sections, the first two dealing with basic principles and mechanisms, and the third concerned with clinical immunology. Being primarily a clinician, I found it very difficult to get through the first two sections. At times I felt that there was simply too much detail devoted to basic principles in a text of this scope. However, I must admit that after completing the first two sections, I was able to appreciate the clinical syndromes with more understanding than I had ever before attained. I would conclude, therefore, that the first two sections served their purpose well. The Appendix presents, in outline form, the clinical and laboratory evaluation, as well as the underlying immunologic problems, of various immune disease states.

This text will provide a useful base of knowledge for any clinician interested in reviewing the current status of immune diseases and their mechanisms. It should provide a useful adjunct to a better understanding of current literature. I would recommend it for hospital and departmental libraries, and larger station dispensaries.

LT Joseph A. Kaufman, MC, USN
Naval Hospital, NNMC, Bethesda, Md.

Manual of Clinical Mycology, by Norman F. Conant, Ph.D.; David T. Smith, M.D.; Roger D. Baker, M.D. and; Jasper L. Callaway, M.D. 3rd ed., 755 pp, 299 illus., $13.50, Philadelphia, W.B. Saunders Co., 1971.

The long overdue third edition of this little giant of clinical mycology has been updated and revised, but still retains the basic format that has made it an important part of the library of specialists in infectious disease, tropical medicine and microbiology. It con-

tains an excellent table of contents and index and is therefore useful as both a reference and text.

There are new chapters on Lobomycosis, African Histoplasmosis, Cladosporosis and Mycotic Keratitis. There is much more information and emphasis on immunology and therapy as related to the fungal diseases. The text is well illustrated. At the end of each chapter there are references to the literature for those interested in studying the diseases in more depth.

The internist will find this book helpful in providing a concise review of the fungal diseases which are becoming more widespread with the increased use of antibiotics, steroids and chemotherapy of neoplasms.

LT Larry V. Staker, MC, USN
Naval Hospital, NNMC, Bethesda, Md.

A Decade of Clinical Progress, edited by Leonard W. Fabian, M.D., 3rd monograph of 1969, Clinical Anesthesia Series, 530 pp, $15.00, Philadelphia, F.A. Davis Co., 1971.

The Clinical Anesthesia Series is a periodic publication of three volumes/year. This particular monograph is the third of 1969, even though it is copyrighted 1971 (they are running a little behind).

The present monograph contains 19 chapters, each written by a different author(s) covering subjects ranging from "advances in monitoring in the past ten years," to "advances in electrosleep and electroanesthesia during the past decade." Many well-known men in anesthesia have collaborated to make this an excellent review of that which is new in anesthesia. Allen B. Dobkin, B. Raymond Fink, J.S. Gravenstein, Henry L. Price, C.R. Stephen, and Alan VanPoznak are a few examples of authorities in the field.

Every article provides a good review of the subject material covered, but not all are written in a manner which emphasizes or, in some cases, even states, which advances have been made in the last ten years. This does not mean that all of the articles are not worth reading or are not a good review of the subject; it is just that some chapters discuss the subject in general while others "relate how it was before 1960, and what has happened since."

After reading the book, it seems to me that the most significant advance in anesthesia in the past ten years has been the routine use of blood gas monitoring which is mentioned specifically in seven of the 19 chapters.

The monograph would be a worthwhile addition to any medical library serving anesthesiologists or nurse anesthetists.

LCDR Richard E. Buckingham, Jr., MC, USN
Naval Hospital, NNMC, Bethesda, Md.

Age Factor and Crevicular Depth of Second Molars After Third Molar Extraction, by CDR R.W. Koch, DC, USN and LCDR J.E. Dice, DC, USN.

The formation of a deepened gingival crevice distal to the second molars is often a problem when third molars are removed. Early investigators considered age an important factor when these crevices developed. The purpose of this study was to determine what part age plays in crevicular depth posterior to second molars following the removal of third molars. Pre- and postoperative data included pocket measurements, plaque scores, and study casts for those specific second and third molars involved in the study. Thirty patients were divided into two age groups, one ranging from 19 to 23 years and the other from 26 to 47 years. No significant difference was found between the two groups in second molar crevicular depth following removal of third molars. A larger mean crevicular depth (5 mm) was found preoperatively in the older group as compared with the younger (2.7 mm). In half the cases, irrespective of age, there was a postoperative reduction in crevicular depth. There were significantly lower plaque scores associated with this crevicular reduction.

CDR R.W. Koch, DC, USN, and
LCDR J.E. Dice, DC, USN.
Research Work Unit MR005.20-6052.

Research Explores Plaque — Combat Zone in Dental Disease, from Information Office, National Institute of Dental Research, Bethesda, Md. 20014. May be purchased in quantity at $0.25/copy (or $8.75/100 copies) from Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.

This informational pamphlet published by NIDR calls attention to the important role of bacterial deposits in the development of dental diseases. It describes technics to eliminate these deposits and thus prevent or control the diseases. Scientists at the institute have discovered enough about the causes of caries and periodontal disease to recognize that different kinds of plaque are mainly responsible for both these disorders.

The pamphlet describes what is now known about plaque, and what can be done to combat its destructive action on the teeth and supporting tissues. It notes that research provides knowledge for preventing dental diseases, but that the application of that knowledge is up to the individuals concerned—the patient and the dentist. While dental research scientists continue to seek more effective methods for preventing oral disease, use of the knowledge available can curb the accumulation of plaque and help prevent caries and periodontal disease, the pamphlet emphasizes.

Fighting Ships Photo Registry, by OUR NAVY Magazine, 24 pp, $1.00, Brooklyn, OUR NAVY, Inc., 1 Hanson Place, Brooklyn, N.Y. 11217.

This helpful catalog provides a complete list of the largest private collection of new and old Navy and Coast Guard ship photographs, and all available from stock. This alphabetical list of many thousands of ship pictures, that have been accumulated for over 50 years, is constantly being updated with views of all newly constructed ships and exclusive views of older ships. Black and white, as well as beautiful hand-colored photos of any Navy or Coast Guard ship since 1883 are available for purchase, from $2.00.

Yangtze Patrol, The U.S. Navy in China, by RADM Kemp Tolley, USN (Ret.), 320 pp, illus., $10.00, Annapolis, U.S. Naval Institute Press, 1971.

China, the oldest nation on the globe with a society that has endured for over two millennia, has been chronicled, analyzed and dissected in a thousand volumes in a thousand ways.

The China story has never been completely told, however, and accounts of the Chinese character and behavior both earn and enjoy readership in whatever form they appear. The wisdom of ancient China — kuei-chü, literally "old custom" — has never changed. The ways in which Chinese people think and act remain fascinating to the Western world.

For 2000 years the Yangtze River has been simultaneously the spine and the central nervous system of the Chinese society. An understanding of how this 3,500 mile artery fits into events of even 200 brief years is a picture of China in microcosm, and a precious lesson in Chinese history. ADM Tolley notes that the Yangtze scene is timeless — the same today as it was in the time of Christ.

It is not odd that this great river should have served as the main stage for modern western adventure in China. The story of gunboat diplomacy on the rolling Yangtze is a portrait of the growth of colonialism in its simplest and most understandable form, as well as the interaction, conflict, and cupidity of the Western powers as they participated in the death throes of a 300-year Manchu dynasty and the emergence of the Republic of China.

But all this is essentially historical dividend. The real and wholly unique character of this volume is in its painstaking portrayal of the life of unfettered and high-hearted Westerners in the most improbable and exotic frontier this world has ever seen.

Entertaining anecdotal writings of American adventures in China from the Civil War to World War II abound, but nowhere has there been a definitive history of our impact on the opening of the Yangtze River as seen severally through the eyes of the captain of a wood-burning gunboat, an expatriate American, a merchant sailor, a sloe-eyed Russian night club hostess, the bamboo remittance man, or the officer of the deck of the PANAY under Japanese attack.

It is all here in this wholly unique volume. A trip up the Yangtze rapids, a battle with bandits at Kiukiang, a pirate attack off Wuhu, a night on the town at Joe Farren's or Shanghai's Cercle Sportif Francais — all will bring the reader a sense of having been there.

As one who was blessed with exposure to the Chinese life for a few previous years, I sense the care with which the account is put together. It is history, but it is history with an incomparable flair. And it is all presented with indefatigable attention to factual and technical detail on the one hand and exquisite attention to humor on the other. To old China Hands and neophytes alike, the volume must provide an unforgettable experience.

LTGEN Victor H. Krulak, USMC (Ret.)

SAN DIEGO RESEARCHER SERVES CITIZENS

Governor Ronald Reagan named Dr. Walter L. Wilkins, scientific director of the Navy Medical Neuropsychiatric Research Unit at Point Loma, to the Citizens Advisory Council in the Department of Mental Hygiene for a three-year term. Dr. Wilkins will represent psychologists on the board and succeeds Dr. Harrison C. Gough of Berkeley, who did not seek reappointment.

Questions and answers

U.S. NAVY MEDICINE will now publish a "Questions and Answers" column. By popular request, the column will provide an impersonal avenue for members of the Medical Department to pose brief, objective questions and queries concerning policies, official procedures, available sources of assistance, and suitable actions to achieve specific goals. We will endeavor to refer appropriate questions to proper authorities, and will publish the comments and answers of particular interest. Questioners should provide their name and official address which will be withheld from publication upon request. Forward inquiries to Editor, U.S. NAVY MEDICINE, Bureau of Medicine and Surgery — Code 18; Dept. of the Navy, Washington, D.C. 20390. This will provide a more impersonal and direct forum for those who decline to participate in the "Letters to the Editor" column. Letters should be brief and precise; private opinions and personal attitudes will not be aired in this column.

Individual letters from HM1 Michael A. Hill, USN, and HM3 Sanford O. Bruce, Jr., USN, of the Medical Dept., NAS, Brunswick, Me., have expressed concern over the present implementation of formal training programs for Physician's Assistants. Both letters articulately point out that, generally speaking, many corpsmen are already performing the functions of "Screeners" proficiently, ordering basic laboratory and X-ray studies, suturing lacerations, writing and filling prescriptions, etc. These men observe that: their services are better utilized in ships, isolated and combat situations where their expertise is valued and respected; personnel shortages and other imposed restrictions tend to limit full utilization of corpsmen capabilities in hospitals and dispensaries within the U.S.; "on the job training" is far preferable to establishing formal training schools; qualifications for corpsmen need to be increased; "misfits" and inadequates should be eliminated; and pride in their Corps should be developed in all corpsmen.

Nobody would take serious issue with the observations of these men who well represent the highly respected Navy Hospital Corpsmen. Rather, let us address the subject of Physician's Assistants — the "why" and "what."

Hospital corpsmen are now experiencing the standardized "professionalism" which has already invaded the Medical, Dental, Nurse and Medical Service Corps. As the need for their services developed further, each of these professionals has been required to meet certain standards and levels of competence established by civilian authorities and authorized licensing boards. With increasing specialization, organized levels of qualification and standardized methods of certification have evolved. This is one way in which our Nation protects its citizens, by insuring that competent and

adequately trained personnel render health care services. Through professional licensing and certification requirements, acceptable practitioners are identified for the laymen who must utilize these services. Hospital corpsmen are now being confronted by this inevitable system of accreditation — it is a national movement, and not simply a Navy innovation. The Navy is keeping step with this development because it would ill serve the corpsmen and Navy Medicine if our physician's assistants were not considered the professional equals of their civilian counterparts.

HM1 Hill and HM3 Bruce sound like excellent candidates for the Physician's Assistant Program, actually. They are dedicated members of the Hospital Corps who urge that corpsmen be used to the limits of their capabilities. They have observed that the present restrictions placed on their functions vary — depending on their current location or circumstance vice ability. They would like to see better screening of men admitted to their Corps, and advise raising of the standards. The Physician's Assistant Program will accomplish this, and more. The program makes it possible for corpsmen to ascend in a career with far greater advancement potential. By a well-ordered system of training and accreditation, the corpsmen skills will be classified, identified, recognized, and utilized more appropriately wherever they may serve. Navy Physician's Assistants will enjoy the satisfaction and security provided by the knowledge that there is a growing demand for their training and skill in both Navy and civilian life. (In the past it has been often regretted that retiring hospital corpsmen seldom found clinical positions in civilian life commensurate with the stature they had attained during naval service.)

So much for the "Why."

The following brief was provided by the Director of the Hospital Corps Division, BUMED — Code 34.

"At the present time we are pursuing three levels of a Physician's Assistant for hospital corpsmen within the Navy. The immediate program or first level is a Physician's Aid (Screener). This level would provide instant relief in some of our congested outpatient departments by having screeners: determine patient priorities; procure routine diagnostic procedures required before seeing a physician; assume responsibility for the follow-up of administrative matters necessary to good management of the department.

"Physician's Aid (Screener)

A ten weeks' intensive training course is given to the Screeners. This returnable quota course is conducted in two parts. Part one consists of four weeks' intensive didactic study at the Naval Medical School, NNMC, Bethesda, Md., followed by six weeks' preceptorship at the student's parent command. The first pilot class commenced training on 16 Aug 1971, with 20 students from select activities. They completed their second phase of training at their parent commands on 15 Oct 1971. Some very favorable reports have been received on their utilization. Personnel selected for the Screener course were in pay grade E-5 through E-7.

"Physician's Assistant

The second level is for a Physician's Assistant that would be utilized in health care services conducting screening type physical examinations; recording patient histories; instructing patients in home care procedures, etc. This category is required to have had two years of college-level training with some credit in biomedical sciences and mathematics; a twelve-month preceptorship followed by a two-year apprenticeship in health care services at a naval hospital and ultimate eligibility for selection to the Warrant Officer rank. This is also a pilot program. The first classes convened on 20 Sep 1971. Three students were assigned to each of the Naval Hospitals, Camp Lejeune, N.C.; Camp Pendleton, Calif.; Jacksonville, Fla.; and Orlando, Fla. Personnel selected were in pay grades E-5 through E-7.

"The third level is that which we feel will be the ultimate goal for a Physician's Assistant program. This would be accomplished by affiliation with a school of medicine offering a baccalaureate degree, and such negotiations are now in progress.

"A requirement for the Warrant Physician's Assistant has been projected for 355 through Fiscal Year 1982."

CDR Charles J. Pearce, MSC, USN, Head of the Curriculum Department of the Naval Medical School, National Naval Medical Center, Bethesda, Md., was recently elected to the Alpha Sigma Lambda Honor Society at George Washington University.

REPORT ON MILITARY DRUG ABUSE

Upon return from a year-end worldwide inspection trip of U.S. installations in Europe and Asia to check up on the drug problem, the Pentagon's two leading officials in the drug field are reporting a breakthrough in the effort to halt drug abuse among American military personnel.

Their basic finding boils down to a sharp decline in the number of hard drug users identified in Vietnam, from a high of five percent detected in June, 1971, when urinalysis was first introduced, to a low of 3.2 percent in December. The overall drug abuse rate for the entire armed forces was even lower — 2.5 percent — in December.

Assistant Secretary of Defense (Health and Environment) Dr. Richard S. Wilbur, and Deputy Assistant Secretary of Defense (Drug and Alcohol Abuse) Army Brigadier General John K. Singlaub attributed the sharp decline to a comprehensive program initiated only six months ago by the Department of Defense.

At a Jan. 7 Pentagon news conference, they said the comprehensive program was a three-pronged effort:

—Positive identification of hard drug users by urinalysis testing.

—Grass roots educational approaches to troops to point out the drug pusher is not a desirable person to have in the outfit.

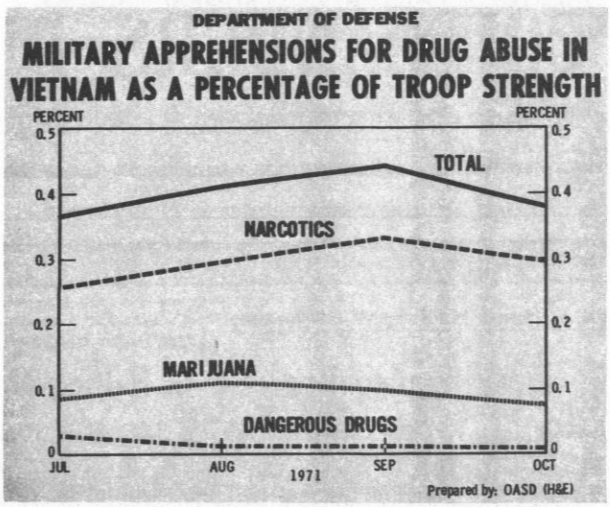
—Improved methods of treatment and rehabilitation to return the drug abuser to duty or society free of drugs.

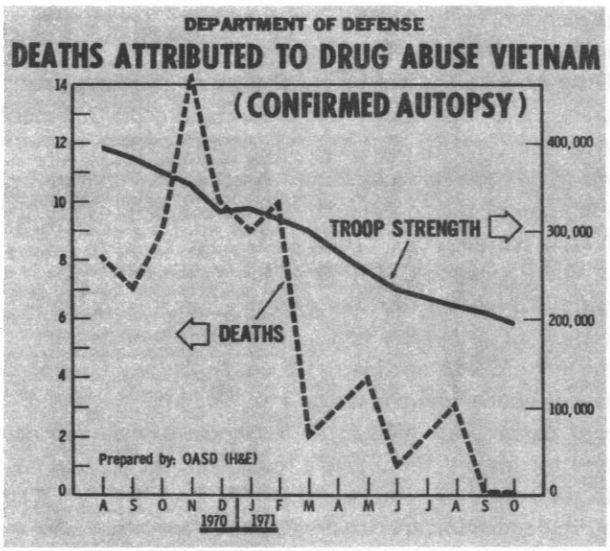
Urinalysis is the Key

The basic tool, they indicated, was urinalysis testing. It accomplished the necessary first job of identifying the problem, both in terms of raw numbers to identify the scope of the problem and in terms of identifying individuals who required medical care and removal from units so as not to infect others.

The expansion of urinalysis testing, from a mandatory check of all personnel leaving Southeast Asia to unannounced spot checks of in-country units, was credited with accelerating the progress of the program. Dr. Wilbur and GEN Singlaub pointed out the spot checks not only provided a better and quicker fix on the problem but also had the obvious effect of being a deterrent. Moreover, it was beneficial in the pure medical sense in that it detected hard drug users earlier, when many were just experimenters or users and not addicted to the drug over a long period.

At the same time, Stateside urinalysis testing was inaugurated for all persons being inducted into the





armed forces — volunteer and draftee alike — and 1.4 percent were identified as hard drug users and denied admission into Service. The rationale here, they explained, is that induction of drug abusers would only contribute to the problem and run the greater risk of spreading the infection.

While both officials were more than satisfied with the accuracy of urinalysis and validity of the results, GEN Singlaub predicted there would be even more unannounced spot checks in the future, implying this kind of testing was the method getting the best results.

Dr. Wilbur took time to stress that the good news is no claim that the drug problem is solved. As he put it, "The total victory would be when nobody is a narcotics user. I would say the Army had done a very good job when it got the statistics for the number of men in the Army on drugs below the number who came into the Service on drugs."

Assistant Secretary Wilbur also cautioned that it is a bold man who claims to have cured alcoholics, heroin users or cigarette smokers. He pointed out, such people can be medically detoxified but that the cure ultimately depends on an individual's will-power to kick the habit.

Drug Education Reaches Troops

Both officials also hailed new initiatives made by Military Assistance Command, Vietnam (MACV) to improve the drug education effort by communicating better with the troops. One effort consisted in recruiting a group of young former addicts, working in the drug education field, to come to Vietnam and communicate with their peer groups. At the same time, the military drug educators were educated in a program that sent them to the best colleges and universities in the United States. Teams were formed from these two groups, plus the addition of one Vietnamese, to work directly with men in the field.

Dr. Wilbur said he feels that this effort has paid off handsomely, that no one is turning to drugs because of lack of knowledge, and that everyone is aware of what a drug abuser looks like and how he acts.

The real proof of the pudding, Dr. Wilbur stressed, is a new change of attitude by the ordinary serviceman, a willingness to turn in heroin pushers. And statistics amply back him up. In June, 95 percent of all court-martial cases on drugs stemmed from military police or criminal investigation division investigation; in December, about 50 percent of the cases were initiated by soldiers and sailors.

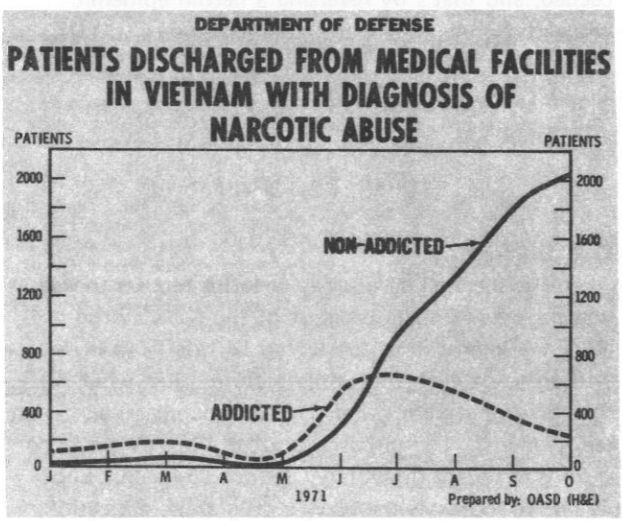
"We have apparently been able to convince soldiers and sailors that someone who pushed heroin is undesirable to have in the barracks or on a ship and ought to be turned in, even if it means turning him in to the Establishment," Dr. Wilbur said.

The doctor cautioned, however, that troops were just turning in heroin pushers, not their buddies shooting drugs or smoking pot.

Detoxification and Rehabilitation

This part of the Department of Defense drug program primarily consisted of expanding the detoxification program into a follow-on rehabilitation program. At the Cam Ranh Bay Drug Treatment Center, which handles SEA returnees, a five-day period of confrontation therapy between psychiatrists and drug users follows the detoxification period. The goal is to convince drug users that they have a problem and that they must accept responsibility for their own actions.

Another dimension was added to the detoxification and rehabilitation effort because of the unannounced



urinalysis spot checks. The basic gain was time, Dr. Wilbur and GEN Singlaub indicated. Once an individual, who is still in-country, is detected, he is pulled out of his unit and sent to a center for 14 days of treatment and an initial exposure to the rehabilitation process. When he returns to duty, he must report for periodic treatment and undergo the basic rehabilitation process at his unit.

Meanwhile, Dr. Wilbur and GEN Singlaub said that legislation is before the Congress which would allow for extending the terms of service of drug users for 30 days to facilitate further treatment and rehabilitation before being returned to civilian life and referral, if necessary, to hospitals for further treatment.

Proposed Legislation

They said that Congress has promised to take up this proposed legislation as soon as possible when it reconvened in January.

While most of their report dealt with the drug problem in SEA, the two officials also checked into the problem in Europe. They found heroin use low, only about one-half of one percent, and this low rate only because the problem there was hashish. Since hashish cannot be detected by urinalysis testing and is not classified as a hard narcotic, the two men did not downgrade the potential threat inasmuch as hashish-users may be psychologically susceptible later to experiment with hard drugs.

The main thrust of the Dr. Wilbur-GEN Singlaub news conference was that of good news – a breakthrough in the drug scene.

"I think the big green machine has done some things right, and I think we ought to tell you about it because the Army has succeeded in a social area, where, to my knowledge, civilians have never succeeded, and that's by reversing a heroin epidemic within the time of a year of its beginning . . ." Dr. Wilbur told the press. – COMMANDERS DIGEST, 27 JAN 1972, DoD, Washington, D.C.

DRUG PROGRAM

Dear Doctor:

This is the first of a series of letter reports to keep you informed on the progress of the Navy's drug program. A logical first step would be briefly to bring you up to date on the whole picture. Just what is the Navy's program, what does it encompass, and what are its plans? The philosophy of the Navy's drug program is set forth on OPNAV Notice 6710 of 1 Sep 1971. It addresses the Navy's drug abuse education, prevention, and rehabilitation programs. This is commonly referred to as the Navy's Five Point Program for Drug Abuse. The five major thrusts of the Navy program are, (1) Education and Information, (2) Command Awareness, (3) Recruit Screening, (4) Law Enforcement, and (5) Rehabilitation. A brief run down on each one of the five points, I think will help clarify the Navy's position.

The Education and Information aspect of the program is primarily to make sure that information concerning drugs is presented in an accurate and factual manner. We do not intend to use any type of scare tactics about how bad drugs are. The intent is to present the accurate facts to an individual to help him decide for himself the possible results of taking drugs. In the education field, the Navy has already established a drug education specialist school at San Diego, Calif., and there are presently over 200 graduates of the school in the fleet assisting commands to set up drug education programs.

The second thrust of the five point program is Command Awareness. A series of articles and newsletters for flag officers has been promulgated to keep them advised of current programs and policies in drug abuse education and rehabilitation. The drug education people are also developing special informational and educational articles and packages for use by unit commanders, commanding officers, and prospective commanding officers to ensure that the information included in these articles is factual, current, and pertinent to the Naval community. The Drug Abuse Advisory Council is responsible for reviewing all the drug abuse educational material in use in the Navy and eliminating that which is not factual. This Council is chaired by the Chief of Naval Personnel and has as members the Chief of the Bureau of Medicine and Surgery, the Chief of Information Service Office, the Chief of the Naval Investigative Service Office, and the Judge Advocate General.

The third point on the five point program is Recruit Screening. Indications to date are that most people on drugs have had some usage prior to coming in the Navy. Procedures have been and are being set up to closely monitor those being enlisted in the Navy, to ensure that actual drug-dependent individuals are not allowed into the Navy.

The fourth point, Law Enforcement, is designed to eliminate illegal drugs from naval vessels and installations and prevent their introduction aboard these facilities. The important point to stress in the enforcement area is that we are primarily focusing our efforts towards the individuals who are trafficking in or pushing drugs. To assist the Naval Investigative Service

(NIS) to provide better service to commands, the Bureau of Naval Personnel has authorized 20 officer billets to NIS. The augmentation of NIS by these 20 billets has resulted in releasing some of their experienced and trained investigators from routine work, such as pursuit of the trafficking problem. The 20 officers that were assigned to NIS throughout the country are all recent graduates from Officer Candidate School at Newport, R.I.

The fifth point of the Navy's five point program is rehabilitation. This is where you, the doctor, will most likely come in contact with the drug abuser. In rehabilitation, the Secretary of the Navy has stipulated that we will help rehabilitate any individual with a drug problem who sincerely desires assistance. To do this we have established two Naval Drug Rehabilitation Centers; one at Naval Air Station, Miramar, Calif., and the second at Naval Air Station, Jacksonville, Fla. The Centers will care for individuals who require concentrated or resident rehabilitation and professional services. For those who are not drug dependent and do not require such intensive rehabilitation, plans call for the establishment of approximately 40 local drug counseling centers at Navy shore commands throughout the world. These centers will serve both the fleet and the shore establishment.

In summary, the intent of the Navy's drug abuse education, prevention, and rehabilitation program is to provide the resources needed by commanders to assist their personnel to overcome drug problems which have gone beyond the individual Navyman's ability to control.

G.M. DAVIS
Vice Admiral, MC, USN
Surgeon General

INSERVICE MEDICAL RESIDENCY/FELLOWSHIP TRAINING POSITIONS

References: BUMEDNOTE 1520
BUMEDINST 1520.10 Series

Inservice Programs. Fully accredited residency training programs are conducted at naval hospitals in 21 separate specialties. Five subspecialty medical fellowship training programs are also conducted at naval hospitals. The accompanying table provides a current listing of these programs and their respective geographical locations (p. 56).

Outservice Programs. A limited number of positions are available to sponsor Navy Medical Corps officers for specialty or subspecialty training in civilian institutions. Outservice training is utilized to provide required training in those specialties where no inservice training program is available.

Application. Interested Medical Corps officers are invited to apply for the specific training program they desire. The application deadline for programs which will commence during Fiscal Year 1974 is 1 Sep 1972. See BUMEDINST 1520.10 Series for request procedures.

Notification. Medical Corps officers applying for Fiscal Year 1974 medical residency and fellowship training programs will be notified of the action taken on their requests during Nov 1972. — Code 316, BUMED.

AVAILABLE RESIDENCY TRAINING POSITIONS

Commencing during the summer of 1972, the following residency training positions will be available in Naval Hospitals at the locations indicated below:

Anesthesiology:	Boston, Chelsea, Mass.
	Philadelphia, Pa.
Pathology:	Oakland, Calif.
	San Diego, Calif.
Psychiatry:	Bethesda, Md.
	Oakland, Calif.

Application procedures for these positions are outlined in BUMEDINST 1520.10E. For further information, write or call Bureau of Medicine and Surgery, Training and Clinical Services Branch (Code 316), Navy Department, Washington, D.C. 20390. Phone: (202) 254-4280/81.

ACTIVE DUTY FOR TRAINING OPPORTUNITIES

Annually, during the months of July and August the Navy is faced with a shortage of medical officers. This results from the release of our younger physicians at termination of their active duty obligations, prior to the reporting of their reliefs.

Certain reservists were invited to request ACDUTRA during the summer of 1971, in an effort to adequately staff all medical facilities. The response was gratifying. This year the invitation is extended to all physicians drilling as members of the Naval Reserve.

Medical Officers contemplating ACDUTRA during

RESIDENCIES/FELLOWSHIPS IN NAVAL ACTIVITIES INDICATING POSITIONS AT EACH YEAR LEVEL BY ACTIVITY

Specialty	Years of training offered	Number of positions each year	BETHESDA	BOSTON	CAMP PENDLETON	GREAT LAKES	JACKSON-VILLE	OAKLAND	PENSACOLA	PHILA-DELPHIA	PORTSMOUTH VA.	SAN DIEGO	OTHER
Aerospace Medicine	3	6	-	-	-	-	-	-	6	-	-	-	-
Anesthesiology	3	24	4	3	-	-	-	4	-	3	4	6	-
Cardiovascular Disease	2	5	2	-	-	-	-	-	-	1	-	2	-
Dermatology	3	7	-	-	-	-	-	-	-	3	-	4	-
Endocrinology & Metabolism	2	2	1	-	-	-	-	1	-	-	-	-	-
Family Practice (GP)	3	12	-	-	4	-	6	-	2	-	-	-	-
Gastroenterology	2	3	1	-	-	-	-	-	-	1	-	1	-
Hematology/Oncology	2	5	1	-	-	-	-	-	-	2	-	2	-
Internal Medicine	3	38	6	4	-	4	-	4	-	6	6	8	-
Neurosurgery	5	2	2	-	-	-	-	-	-	-	-	-	-
Neurology	3	2	2	-	-	-	-	-	-	-	-	-	-
Obstetrics/Gynecology	3	19	3	2	-	2	-	2	-	2	4	4	-
Occupational Medicine	3	1	-	-	-	-	-	-	-	-	-	-	1
Ophthalmology	3	9	3	-	-	-	-	2	-	1	-	3	-
Orthopedics	4	16	2	2	-	-	-	3	-	2	3	4	-
Otolaryngology	4	10	2	-	-	-	-	3	-	1	-	4	-
Pathology	4	10	3	-	-	-	-	2	-	-	2	3	-
Pediatrics	3	19	3	2	-	-	-	3	-	2	4	5	-
Plastic Surgery	2	1	1	-	-	-	-	-	-	-	-	-	-
Preventive Medicine (General)	3	1	-	-	-	-	-	-	-	-	-	-	1
Psychiatry	3	11	4	-	-	-	-	3	-	4	-	-	-
Pulmonary Diseases	2	2	1	-	-	-	-	-	-	-	-	1	-
Radiology	3	15	4	-	-	-	-	2	-	3	-	6	-
Surgery	4	18	2	2	-	2	-	2	-	2	4	4	-
Thoracic & CV Surgery	2	3	1	-	-	-	-	-	-	-	-	2	-
Urology	4	8	2	-	-	-	-	1	-	1	2	2	-
TOTALS		249	50	15	4	8	6	32	8	34	29	61	2
			249										

FY 1973, should consider taking it during July or August at one of the facilities listed here which require the services of a physician in their specialty, or those of a general medical officer, if they prefer. Requests for training duty should be processed through the appropriate District Medical Program Officer.

ANESTHESIOLOGY

Beaufort, S.C.
Bremerton, Wash.
Orlando, Fla.

ENT

Great Lakes, Ill.
St. Albans, N.Y.

GENERAL SURGERY

Corpus Christi, Tex.
Pt. Hueneme, Calif.

INTERNAL MEDICINE

Cherry Point, N.C.
Patuxent River, Md.
Pt. Hueneme, Calif.
Whidby Island, Wash.
Boston, Mass.

OB-GYN

Key West, Fla.
Memphis, Tenn.
Whidby Island, Wash.
NSB, New London, Conn.

OPHTHALMOLOGY

Bremerton, Wash.
St. Albans, N.Y.

PATHOLOGY

Great Lakes, Ill.

PEDIATRICS

Bremerton, Wash.
Key West, Fla.
Lemoore, Calif.
Orlando, Fla.
Portsmouth, N.H.
NAS, Alameda, Calif.
MCSC, Barstow, Calif.
NWC, China Lake, Calif.
Main Navy Disp., Wash., D.C.

PSYCHIATRY

Bremerton, Wash.

PSYCHIATRY (Con.)

Camp Pendleton, Calif.
Corpus Christi, Tex.
Whidby Island, Wash.
MCRD, San Diego, Calif.

RADIOLOGY

Corpus Christi, Tex.

UROLOGY

Bremerton, Wash.

GENERAL PRACTICE

NavSta, Mayport, Fla.
NAS, Albany, Ga.
NAS, Lakehurst, N.J.
COMNAV AIRLANT, Norfolk, Va.
CINCLANT FLT, Norfolk, Va.
NTC, San Diego, Calif.
NavHosp, Newport, R.I.
NavHosp, Long Beach, Calif.
NavHosp, Key West, Fla.
NavHosp, Oakland, Calif.

ALL SPECIALTIES

Newport, R.I.

All stations are Naval Hospitals unless otherwise indicated. — Code 36, BUMED.

NEW ASSISTANT CHIEF FOR AEROSPACE MEDICINE

CAPT Edward A. Jones, MC, USN, has assumed the duties of Assistant Chief for Aerospace Medicine, Bureau of Medicine and Surgery, Navy Department. He succeeded CAPT Leonard P. Jahnke, MC, USN, who served in this capacity from 1 August 1968 until his retirement on 30 June 1971.

CAPT Jones has served 23 years in the U.S. Navy. In September 1952 he was designated a Naval Flight Surgeon and has had extensive duty with the Marines, aboard aircraft carriers, at major continental and overseas naval air stations and at a naval hospital. In addition, he has served on the staffs of major fleet and shore commands and with foreign-based activities. Just prior to his present appointment, he served as Commanding Officer, U.S. Naval Hospital, Rota, Spain, with additional duty on the Staff, Commander Naval Activities, Spain and at the Naval Station, Rota, Spain.

CAPT Edward A. Jones, MC, USN.

NAVAL RESERVE DENTIST SELECTED TO RADM

Dr. Roman George Ziolkowski of Pomona, Calif., has been selected for promotion to the grade of Rear Admiral in the Naval Dental Corps Reserve. He will assume his new rank approximately 1 Nov 1972, and will replace RADM Harry G. Ewart, DC, USNR-R, who will retire. RADM George C. Coleman, DC, USNR-R, an orthodontist from Coral Gables, Fla., and former Third Vice-President of the American Dental Association, is the only other dentist who holds the grade of Rear Admiral in the Naval Dental Corps Reserve.

A general practitioner, Dr. Ziolkowski has been active in local, state, and civic affairs for many years. A 1940 graduate of the School of Dentistry, Loyola University of Chicago, he served on active duty in the Navy from 1942 to 1947.

Dr. Ziolkowski is Vice-Chairman of the Council on Dental Trade and Laboratory Relations of the Southern California Dental Association. In addition, he is active in the Navy League and is on the National Advisory Committee of the Naval Reserve Association. Dr. Ziolkowski is a member of Omicron Kappa Upsilon, honorary dental fraternity; the American Academy of General Dentistry; and is a Fellow of the International College of Dentists.

CAPT Roman G. Ziolkowski, DC, USNR-R, Flag Selectee, Dental Corps Reserve.

Unfortunately, the supply of U.S. NAVY MEDICINE publications is limited. No Hospital Corpsmen, and only a limited number of Nurse Corps officers normally receive individual copies. Please don't throw away your copy — pass it along to other members of the Navy Medical Department family who fail to receive it. Be sure your nurses and corpsmen get to see this periodical which often contains information of interest to them.

AWARDS AND HONORS

Silver Star Medal

HM2 Frederick M. Jensen, USN
HN John V. Kickham, USN

Legion of Merit

CAPT Jeannette Collins, NC, USN (Ret.)
CDR Dorsey J. Moore, DC, USN

Bronze Star Medal

HM3 Gary J. Baker, USN
HM3 Gregory A. Hartshorn, USN
HM3 Juan M. Sanchez, USN

Meritorious Service Medal

CAPT David J. McLellan, MSC, USN
CAPT Dermot A. Murray, MC, USN
CAPT Henry H. Scofield, DC, USN

Navy Commendation Medal

HM1 Fidencio Avila, USN
CAPT Dudley E. Brown, Jr., MC, USN
HMC Stephen W. Brown, USN
HM3 Martin J. Cavins, USN
HM2 Howard L. Chapman, USN
CAPT William G. Cumming, MSC, USN
HMCS Porter S. Decker, Jr., USN
LCDR James E. DeWitt, MSC, USN
HM2 Richard C. Doggett, USN
HN Glenn E. Eidson, USN
HM1 Vincente R. Fernandez, USN
HMC Elrie Hazelwood, Jr., USN
LT Ivan D. Howard, MSC, USN
LT Sandra A. Kirkpatrick, NC, USN
HM3 Wandal J. Moore, USN
HM3 Cory A. Painter, USN
HM1 Robert E. Ritz, USN
CDR Rodger F. Schindele, MSC, USN

Navy Commendation Medal (Con.)

LCDR Donald L. Schoenmann, MSC, USN
LT Howard L. Skinner, MSC, USN
HMCS Jim M. Smith, USN
HM3 Barry L. Snider, USN
HMCS John A. Thayer, USN
LCDR James C. Thompson, MSC, USN
HM3 Charles A. Wood, USN
HMC Leon B. Wood, USN

Navy Achievement Medal

HMC Lee K. Allen, USN
HM1 George D. Boyles, USN
HM2 George W. Brack, Jr., USN
HM2 Arthur M. Dela Huerta, USN
HM3 Donald W. Delaney, USN
HMC Joseph F. DePompa, USN
HM1 Delbert W. Englehardt, USN
LCDR Robert Esquire, DC, USN
HM1 James A. Farmer, USN
HN Ronald W. Gibson, USN
HM1 James W. Hall, USN
HM1 Edgar R. Hanna, USN
HM1 Robert J. Harmor, USN
HM1 John R. Heltsley, USN
HM3 Sam C. Houston, USN
HM3 Donald A. Johnson, USN
HM2 George E. Johnston, USN
HM1 Joseph C. Laporte, USN
HM2 Howard T. Lightbody, USN
HM2 David M. Perkins, USNR
HM2 Ronald J. Pittler, USN
LCDR John R. Turner, MSC, USN
DTCM Harry B. Walton, Jr., USN
HM1 Robert J. Williams, USN
HMC Jon R. Winter, USN

AMERICAN BOARD CERTIFICATIONS

American Board of Dermatology

LCDR Rainer S. Schmidt, MC, USN

American Board of Internal Medicine

CDR Alfred R. Chappelka, Jr., MC, USN
LCDR Paul E. Cianci, MC, USN
LCDR James J. Houser, MC, USN
LCDR Robert B. Lewis, MC, USN
LCDR Robert F. McCauley, MC, USN

American Board of Internal Medicine (Con.)

LCDR Carl J. Pepine, MC, USN
CDR Albert K. Rogers, MC, USN

American Board of Obstetrics and Gynecology

LCDR William J. Connolly, MC, USNR
CDR Donald W. Cowherd, MC, USN
CDR Eugene L. Murphy, MC, USN
CDR Joseph E. O'Donnell, MC, USN

American Board of Obstetrics and Gynecology (Con.)

CDR Jerome M. Reed, MC, USN
LCDR William D. Roche, Jr., MC, USN
LCDR Robert L. Smith, MC, USN
LCDR Britton E. Taylor, MC, USN

American Board of Orthopaedic Surgery

CDR Stanley D. Harmon, MC, USN

American Board of Otolaryngology

CDR William W. Johnson, MC, USN

American Board of Pathology

LCDR Joseph A. Decolli, MC, USN
LCDR Robert D. Hodgell, MC, USN
LCDR Daniel J. Kelly, MC, USNR
LCDR Malcolm M. Murdoch, MC, USN

American Board of Pedodontics

CDR Arthur J. Nowak, DC, USNR-R

American Board of Psychiatry and Neurology

CDR George A. Conkey, MC, USN
CDR William E. Deignan, MC, USN

American Board of Radiology

LCDR Warren A. Hinchcliffe, MC, USNR (Diagnostic Radiology)
LCDR Harvey Thalblum, MC, USN

American Board of Surgery

CDR Robert R. Abbe, MC, USN
LCDR Frank E. Ehrlich, MC, USN
LCDR Michael L. Gelfand, MC, USNR
LCDR Francis D. Keenan, Jr., MC, USN
CDR W.A.J. MacLeod, MC, USN
LCDR Thomas A. Queen, MC, USN
LCDR Samuel G. Rosenthal, MC, USNR
LCDR Conrad W. Sanders, Jr., MC, USNR
LCDR Donald L. Sturtz, MC, USN

LCDR RHODES HONORED

LCDR Durward L. Rhodes, MSC, USN, was named the outstanding Naval Aerospace Physiologist for 1971 at the annual Naval Aerospace Physiologists Meeting conducted at Oklahoma City, Okla., Oct. 19-21, 1971. LCDR Rhodes, currently attached to the Naval Training Device Center, Orlando, Fla., received the award from CDR Paul W. Scrimshaw, MSC, USN, Head, Aerospace Physiology Training Branch, Bureau of Medicine and Surgery.

The meeting was conducted at the Civil Aeromedical Institute of the FAA Aeronautical Center in Oklahoma City. Personnel from the FAA Civil Aeromedical Institute and civilian and military personnel from the Naval Aerospace Physiologists community presented scientific papers dealing with current aeromedical and physiological stresses.

Also discussed were items of aviation protective equipment under development and an introduction of the new family of physiological training devices such as the 9E6 Universal Ejection Seat Trainer and the 9A15 Low Pressure Chamber.

Guest speaker at the banquet was CDR W.R. Crawford, MC, USN, Head, Aeromedical Branch, Naval Air Test Center, Patuxent River, Md. Doctor Crawford delivered a presentation on the role of physiologists in future aviation and space programs.—PAO, Naval Aerospace Medical Center, Pensacola, Fla.

CORRESPONDENCE AND CONTRIBUTIONS from the field are welcomed and will be published as space permits, subject to editing and possible abridgment. All material should be submitted to the Editor, U.S. Navy Medicine, Code 18, Bureau of Medicine and Surgery, Washington, D.C. 20390

NOTICES should be received not later than the third day of the month preceding the month of publication.

PROFESSIONAL PAPERS AND ARTICLES should be typewritten on one side of the paper, double spaced, with liberal margins. Original and one carbon copy are required. Generic names of drugs are preferred. If the author's present affiliation differs from that under which the reported work was done, both should be given. Unless otherwise indicated, it will be assumed that the article presented has not been previously printed or delivered elsewhere. Papers which have been delivered or printed elsewhere, covered by copyright, cannot be reprinted in Navy Medicine without the written permission of the author(s) and copyright holder. It is the responsibility of the author(s) to inform U.S. Navy Medicine when the material submitted has been previously used or copyrighted. Navy Medicine will be happy to request permission to reprint from the copyright holder when this is necessary.

ILLUSTRATIONS are acceptable when they substantially contribute to the understanding of the basic material. Only distinct, glossy, black and white PHOTOGRAPHS which are functional can be printed. Prints should not be mounted, stapled, clipped or otherwise deformed and can be marked lightly on the back with the figure number. Legends should be typed consecutively on a separate paper with the indicated figures; credits for the photography may also be included. Identities of patients should be masked. DRAWINGS, TABLES AND GRAPHS should be minimal in number and properly labeled. They should be neatly done in heavy black ink on white paper, one to a page.

SUGGESTIONS are invited concerning U.S. Navy Medicine, its content and form.

U.S. NAVAL PUBLICATIONS and FORMS CENTER
ATTN: CODE 306
5801 Tabor Avenue
Philadelphia, Pa. 19120
Official Business

POSTAGE AND FEES PAID
NAVY DEPARTMENT

NAVY WIFE OF THE YEAR FOR 1972 — Marilyn Maw, and her husband, CDR Ralph B. Maw, DC, USN, an oral surgeon at the Great Lakes Naval Hospital, listen while a congratulatory message from Admiral Elmo R. Zumwalt, Chief of Naval Operations, is read during a brief ceremony in Mrs. Maw's honor at Great Lakes on 11 Mar 1972. A native of Alhambra, Calif., Mrs. Maw was named Navy Wife of the Year for 1972 and will represent the Navy in the Sixth Annual Military Wife of the Year Awards contest finals. The winner will be announced in Washington, D.C. in May.—PAO, Ninth Naval District, Naval Base, Great Lakes, Ill. (Photo by PH1 Dave Garrison)

U.S. NAVY MEDICINE

☆ U.S. Government Printing Office: 1972—483-833/9